

DEC 31 1918

Volume IX. No. 10.

July 25, 1906.



The University of Minnesota Bulletin

The Graduate School

Announcement, 1906=1907

Entered at the Postoffice
in Minneapolis as second-class matter
MINNEAPOLIS, MINN.

The University Catalogues are published by authority of the Board of Regents, as a regular series of bulletins. The number issued each year varies from ten to twelve. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them. In calling for bulletins, please state department of the University concerning which you desire information. The full catalogue will be sent only upon receipt of ten cents to pay postage. Address,

THE REGISTRAR,

The University of Minnesota,
Minneapolis, Minnesota.

The University

The University of Minnesota comprises the following named colleges, schools, and departments :

THE GRADUATE SCHOOL

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS

THE SCHOOL OF MINES

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY

THE COLLEGE OF EDUCATION

THE UNIVERSITY SUMMER SCHOOL

THE DEPARTMENT OF AGRICULTURE

The College of Agriculture

The School of Agriculture

Short Course for Farmers

The Dairy School

The Crookston School of Agriculture

The Experiment Stations:

The Main Station at St. Anthony Park

The Sub-Station at Crookston

The Sub-Station at Grand Rapids

THE COLLEGE OF LAW

THE COLLEGE OF MEDICINE AND SURGERY

THE SIX-YEAR MEDICAL COURSE

THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY

THE COLLEGE OF DENTISTRY

THE COLLEGE OF PHARMACY

THE GEOLOGICAL AND NATURAL HISTORY SURVEY

In the COLLEGE OF SCIENCE, LITERATURE AND THE ARTS, there is a four-year course of study leading to the degree, Bachelor of Arts. The work of the first year is elective within certain limitations as to the range of subjects from which the electives may be chosen. The remaining work of the course is entirely elective, with the provision that a certain number of long courses be selected. The course is so elastic that it permits the student to make the general scope of his course classic, scientific or literary, to suit his individual purpose.

THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS offers courses of study, of four years each, in civil, mechanical, electrical and municipal engineering, leading to the degrees of Civil, Mechanical, Electrical and Municipal Engineer. This college offers a four-year course of study in science and technology, leading to the degree of Bachelor of Science, with an additional year leading to the engineer's degree in any one of the various lines

offered in the college. This college also offers graduate work leading to the degree Master of Science.

THE SCHOOL OF MINES offers four-year courses of study in mining and metallurgy upon completion of which the degrees, engineer of mines and metallurgical engineer, are conferred.

THE SCHOOL OF ANALYTICAL AND APPLIED CHEMISTRY, leading to the degrees Analytical Chemist and Chemical Technologist, offers two courses of study of four years each in analytical and applied chemistry.

THE COLLEGE OF EDUCATION receives students who have completed two years of college work, and offers them a three-year course leading to the master's degree. At the end of the second year students may receive the bachelor's degree and the University teacher's certificate. Graduates of other colleges, who have pursued an equivalent course in education, may enter for the master's degree.

THE GRADUATE SCHOOL gathers into a single organization and unites for the purposes of administration all the activities of the University in all its schools and colleges in so far as they relate to advanced instruction offered for the second or higher degrees, viz.: Master of Arts and Doctor of Philosophy conferred for advanced, non-technical study; Master of Science and Doctor of Science for technical study; Master of Laws and Doctor of Civil Law for advanced legal studies. The privileges of this school are in general open to all Bachelors of Arts, of Science, pure and applied, and of Laws, from reputable colleges and universities having courses substantially equivalent to those at this university.

THE UNIVERSITY SUMMER SCHOOL is organized for a six weeks session in June and July under the direction of the State Department of Public Instruction. In the elementary section courses are given for teachers in all the common school branches and in preparation for the state teachers' certificates. In the college section courses are given for high school teachers and in preparation for the state professional certificate. Students who desire University entrance credits and credits toward the bachelor's degree may secure these by pursuing not more than two full courses at each session.

SPECIAL COURSES. In each of the Colleges, students of mature age and adequate preparation are permitted to pursue, under the direction of the faculty, one or two distinct lines of study.

EXTENSION LECTURES. Professors in the University are prepared to give a limited number of extension lectures from time to time. For subjects, speakers, terms and dates, application should be made to the Chairman of the Committee on University Extension.

THE COLLEGE OF AGRICULTURE offers a four-year course in agriculture. The degree of Bachelor of Science, in Agriculture, is conferred on completion of the course. Students in this College may specialize along the line of forestry or of home economics and secure the degree Bachelor of Science (in Forestry, or in Home Economics).

THE SCHOOL OF AGRICULTURE offers a three-years course of study and is a training school for practical farm life and in domestic economy. The College of Agriculture is open to graduates of this School who have completed the fourth year of work required for admission to the college.

The Dairy School offers practical instruction in dairying, specially de-

signed for those who are actually engaged in the manufacture of butter and cheese.

The Short Course for Farmers is designed to be of the greatest help possible to those actually engaged in farming.

The Crookston State School of Agriculture offers a course of study quite similar to that given in the School of Agriculture.

THE COLLEGE OF LAW offers a three-years course of instruction leading to the degree of Bachelor of Laws. Graduate work leading to the degrees, Master of Laws, and Doctor of Civil Laws is offered. An evening class is provided in this college.

THE COLLEGE OF MEDICINE AND SURGERY AND THE COLLEGE OF HOMEOPATHIC MEDICINE AND SURGERY offer four-year courses of study, of nine months each. Upon completion of either of the prescribed courses the degree, Doctor of Medicine is conferred.

In the Colleges of Science, Literature and the Arts, of Medicine and Surgery, and of Homeopathic Medicine and Surgery, there has been established a combined course of six years, leading to the degrees, Bachelor of Science, and Doctor of Medicine.

THE COLLEGE OF DENTISTRY offers a three-years course of study, of nine months each. Upon completion of the prescribed course the degree of Doctor of Dental Surgery is conferred.

THE COLLEGE OF PHARMACY offers a two- or three-years course of study leading to the degree of Pharmaceutical Chemist. This college also offers graduate work leading to the degrees, Master of Pharmacy and Doctor of Pharmacy.

Historical

AN ACT to re-organize and provide for the government and regulation of the University of Minnesota, and to establish an Agricultural College therein.

As amended by Chapter X of the General Laws of 1872:

AN ACT to amend Chapter I of the Session Laws of 1868, relating to the University of Minnesota.

Section 1. The object of the University of Minnesota, established by the Constitution at or near the Falls of St. Anthony, shall be to provide the means of acquiring a thorough knowledge of the various branches of literature, science and the arts, and such branches of learning as are related to agriculture and the mechanic arts, including military tactics and other scientific and classical studies.

Sec. 2. There shall be established in the University of Minnesota five or more colleges or departments, that is to say, a College of Science, Literature, and the Arts, a College of Agriculture, including "military tactics," a College of Mechanic Arts, a college or Department of Law, and also a College or Department of Medicine. The Department of Elementary Instruction may be dispensed with at such a rate and in such wise as may seem just and proper to the Board of Regents.

Sec. 3. The government of the University shall be vested in a board of ten Regents of which the Governor of the State, the State Superintendent of Public Instruction, and the President of the University, shall be members ex-officio and the remaining seven members thereof shall be appointed by the Governor, by and with the advice and consent of the Senate. Whenever a vacancy occurs therein, for any cause, the same shall be filled for the unexpired term in the same manner. Of the Regents thus appointed, two shall be commissioned and hold their offices for one year, and two for two years, and three for three years. Their successors shall be appointed in a like manner, and shall hold their offices for the full term of three years from the first Wednesday of March succeeding their appointment and until their successors are appointed and qualified. The President of the University shall have the same rights, powers and privileges as other members, *except the right of voting, and shall be, ex-officio, the Corresponding Secretary of the Board of Regents.

Sec. 4. The Regents of the University shall constitute a body corporate, under the name and style of "The University of Minnesota," and by that name may sue and be sued, contract and be contracted with, make and use a common seal and alter the same at pleasure; a majority of the voting members shall constitute a quorum for the transaction of business, and a less number may adjourn from time to time.

Sec. 5. The Board of Regents shall elect from the members of the

*By the later act the President has been given a vote.

Board, a President of the Board; (a) Recording Secretary and (a) Treasurer, who shall hold their respective offices during the pleasure of the Board. And the President and Treasurer each before entering upon the duties of his office, shall execute a bond in the penal sum of fifty thousand dollars, with at least two sufficient sureties, to the State of Minnesota, to be approved by the Governor, conditioned for the faithful and honest performance of the duties of his office according to law, which bonds, when so approved, shall be filed at the office of the Secretary of State.

Sec. 6. The Board of Regents shall have the power, and it shall be their duty, to enact by-laws for the government of the University of Minnesota in all its departments; to elect a President of the University, and in their discretion a Vice-President, and the requisite number of professors, instructors, officers and employes, and to fix their salaries, (and) also the term of office of each, and to determine the moral and educational qualifications of applicants for admission, and in the appointment of professors, instructors and other officers, and assistants of the University, and in prescribing the studies and exercise thereof; and in all the management and government thereof, no partiality or preference shall be shown to one sect or religious denomination over another; nor shall anything sectarian be taught therein. And the Board of Regents shall have the power to regulate the course of instruction, and (to) prescribe the books and authorities to be used, and also to confer such degrees and grant such diplomas as is usual, in their discretion. It shall be the duty of the Recording Secretary to record all the proceedings of the Board, and carefully preserve all its books and papers; and before entering upon the duties of his office he shall take and subscribe an oath to perform his duties honestly and faithfully as such officer. It shall be the duty of the Treasurer to keep an exact and faithful account of all moneys, bills receivable and evidence of indebtedness, and all securities of property received or paid out by him, and before entering upon his duties shall take and subscribe an oath that he will well and faithfully perform the duties of Treasurer thereof. It shall be the duty of the President to preside at the meetings of the Board; and, in case of his inability to preside, the Board may appoint a President *pro tempore*.

Sec. 7. In addition to all the rights, immunities, franchises and endowments heretofore granted or conferred upon the University of Minnesota, for the endowment, support and maintenance thereof, there shall be and is hereby inviolably appropriated and placed at the disposal of the Board of Regents thereof, to be drawn from the State treasury upon the order of the President, drawn upon the State Auditor, countersigned by the Secretary of the Board, and payable to the order of the Treasurer of the Board, all the interest and income of the fund to be derived from the sale of all lands granted and to be granted to the State of Minnesota by virtue of an act of Congress, entitled "An act donating lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," approved July 2d, 1867, and also all such gifts, grants and contributions to the endowment thereof as may be derived from any and all such sources.

Sec. 8. And in order to effect a settlement of all remaining indebtedness of the University, all the powers and authorities given by Chapter 18 of the laws of 1864, entitled "An act relating to the University of Minnesota," and Chapter 11 of the laws of 1866, entitled "An act to amend an act

relating to the University of Minnesota, approved March 4, 1864," to the Regents therein mentioned, are hereby given to and conferred upon the Board of Regents of the University of Minnesota aforesaid, and the said acts are hereby continued and shall be in force until such outstanding indebtedness is fully liquidated.

Sec. 9. The first meeting of the first Board of Regents under the provisions of this act, shall be holden at the University building on the first Wednesday in March, 1868, at which meeting the officers of the Board shall be elected, and the annual meetings of the Board shall be holden on the second Tuesday in December in each and every year thereafter.

Sec. 10. Any person or persons contributing a sum of not less than fifteen thousand dollars shall have the privilege of endowing a professorship in the University, the name and object of which shall be designated by the Board of Regents.

Sec. 11. The said Board of Regents shall succeed to and have control of the books, records, buildings, and all other property of the University; and the present Board of Regents shall be dissolved immediately upon the organization of the Board herein provided for. Provided, that all contracts made at that time, binding upon the Board then dissolved, shall be assumed and discharged by their successors in office.

Sec. 12. It shall be the duty of the Board of Regents herein provided for, to make arrangements for securing suitable lands, pursuant to the act of Congress, above mentioned, in the vicinity of the University, for an experimental farm, and as soon thereafter as may be to make such improvements thereon as will render the same available for experimental purposes in connection with the course in the agricultural college; and for such purposes, the Board of Regents is hereby authorized to expend a sum not exceeding the amount specified by the act of Congress aforesaid,

Sec. 13. On or before the second Tuesday in December in each and every year, the Board of Regents, through their President, shall make a report to the Governor, showing in detail the progress and condition of the University during the previous University year, the wants of the institution in all its various departments—the nature, costs and results of all improvements, experiments and investigations, the number of professors and students—the amount of money received and disbursed—and such other matters, including industrial and economic statistics, as they deem important or useful. One copy of said report shall be transmitted to each of the other colleges endowed under the provisions of the said act of Congress, and one copy to the Secretary of the Interior.

Sec. 14. The President of the University shall be the President of the General Faculty, and of the special faculties of the several departments or colleges, and the executive head of the institution in all its departments. As such officer, he shall have authority, subject to the Board of Regents, to give general direction to the practical affairs and scientific investigations of the University, and in the recess of the Board of Regents to remove any employe or subordinate officer not a member of the Faculty and supply for the time being any vacancies thus created. He shall perform the customary duties of a corresponding secretary, and may be charged with the duties of one of the professorships. He shall make to the Superintendent of Public Instruction, on or before the second Tuesday in December in each and every year, a report showing in detail the progress and condition of the Uni-

versity during the previous University year—the number of professors and students in the several departments—and such other matters relating to the proper educational work of the institution as he shall deem useful. It shall be the duty of the President of the University to make to the Board of Regents, on or before the second Tuesday in December in each and every year, a report showing in detail the progress and condition of the University during the previous University year—the nature and results of all important experiments and investigations and such other matters, including economic and industrial facts and statistics, as he shall deem useful.

Sec. 15. Chapter eighty of the laws of eighteen hundred and sixty, chapter eighty-seven of the laws of eighteen hundred and sixty-two, and so much and such parts of any and all acts and laws, whether general or special, as are inconsistent with the provisions of this act, are hereby repealed.

Sec. 16. This act shall take effect and be in force from and after its passage.

Approved February 18, 1868. Act to amend approved February 29. 1872.

The Board of Regents

CYRUS NORTHROP, LL. D., MINNEAPOLIS . . . *Ex-Officio*
The President of the University

The HON. JAMES T. WYMAN, MINNEAPOLIS . . . 1907
The President of the Board

The HON. JOHN A. JOHNSON, ST. PETER . . . *Ex-Officio*
The Governor of the State

The HON. JOHN W. OLSEN, ALBERT LEA . . . *Ex-Officio*
The State Superintendent of Public Instruction

The HON. STEPHEN MAHONEY, MINNEAPOLIS . . . 1907

The HON. O. C. STRICKLER, NEW ULM . . . 1907

The HON. S. G. COMSTOCK, MOORHEAD . . . 1909

The HON. THOMAS WILSON, ST. PAUL . . . 1909

The HON. B. F. NELSON, MINNEAPOLIS . . . 1909

The HON. A. E. RICE, WILLMAR . . . 1909

The HON. EUGENE W. RANDALL, MORRIS . . . 1910

The HON. DANIEL R. NOYES, ST. PAUL . . . 1910

C. D. DECKER, AUSTIN
Secretary of the Board

Executive Officers

THE UNIVERSITY

CYRUS NORTHROP, LL.D., *President*

ERNEST B. PIERCE, B.A., *Registrar*

C. D. DECKER, *Purchasing Agent and Secretary of the Board of Regents*

THE COLLEGES

JOHN F. DOWNEY, M.A., C.E., *Dean of the College of Science, Literature and the Arts*

FREDERICK S. JONES, M.A., *Dean of the College of Engineering and the Mechanic Arts*

WILLIAM R. APLEBY, M.A., *Dean of the School of Mines*

GEORGE B. FRANKFORTER, Ph.D., *Dean of the School of Chemistry*

GEORGE F. JAMES, Ph.D., *Dean of the College of Education*

HENRY T. EDDY, C.E., Ph.D., LL.D. *Dean of the Graduate School*

WILLIAM M. LIGGETT, *Dean and Director of the Department of Agriculture*

WILLIAM S. PATTEE, LL.D., *Dean of the College of Law*

FRANK FAIRCHILD WESBROOK, M. A., M. D., C. M., *Dean of the College of Medicine and Surgery*

EUGENE L. MANN, B.A., M.D., *Dean of the College of Homeopathic Medicine and Surgery*

ALFRED OWRE, D.M.D., M. D., *Dean of the College of Dentistry*

FREDERICK J. WULLING, PHM.D., LL.M., *Dean of the College of Pharmacy*

LIBRARIES AND MUSEUMS

JAMES T. GEROULD, B. A., *Librarian*

LETTIE M. CRAFTS, B.L., *Assistant Librarian*

INA FIRKINS, B.L., *Library Assistant*

MARY S. MCINTYRE, B.S., *Librarian of School of Agriculture*

THOMAS G. LEE, B.S., M.D., *Librarian of Department of Medicine*

HUGH E. WILLIS, LL.M., *Librarian of the College of Law*

CHRISTOPHER W. HALL, M.A., *Curator Geological Museum*

HENRY F. NACHTRIEB, B.A., *Curator of the Zoölogical Museum*

BUILDINGS AND GROUNDS

ALLEN W. GUILD, *Superintendent of Buildings*

EDWIN A. CUZNER, *Superintendent of Grounds*

The University Council

At the regular meeting of the Board of Regents of the University May 31st, 1905, a University Council was established according to the following plan:

I. The name of the body shall be the University Council. It shall consist of the President of the University, the Deans of the various colleges and schools, one elected representative from each college or school for each four hundred students or major fraction thereof, and one representative of the general alumni association.

II. The elected members shall serve for a period of one year. They shall be chosen by the various faculties at the time of the selection of standing committees. The representative of the general alumni association shall be chosen by that body at its annual meeting from among the alumni who are not members of the University.

III. The Council shall be authorized to—

a) Appoint the following committees or the faculty representation thereon:

The University auditing committee

The University press committee

The committee on athletics

The committee on University relations to other institutions of higher learning

The committee on health and sanitation

The committee on commencement and other University functions

The committee on catalogue, programs and courses of study

The committee on student entertainments and social affairs

and such other such committees as the general University interests may require.

b) Receive reports from such committees and to make such recommendations as may be required.

c) Consider and act upon any matter of general University interest beyond the province of a single faculty which may be referred to it by the President of the University or any faculty.

IV. The Council shall hold stated meetings upon the first Monday of October, December, April and June, and such other meetings as the President of the University may call.

Representatives to the Council

The College of Science, Literature and Arts

DEAN JOHN F. DOWNEY

PROFESSOR F. L. MCVEY

PROFESSOR WILLIS M. WEST

PROFESSOR H. F. NACHTRIEB

The College of Engineering

DEAN F. S. JONES

PROFESSOR GEORGE D. SHEPARDSON

The School of Mines

DEAN WM. R. APPELBY

The School of Chemistry

DEAN GEO. B. FRANKFORTER

The College of Education.

DEAN GEO. F. JAMES

The Graduate School

DEAN H. T. EDDY

The College of the School of Agriculture

DEAN WM. M. LIGGETT

PROFESSOR HARRY SNYLER

The College of Law

DEAN WM. S. PATTEE

JUDGE A. C. HICKMAN

The College of Medicine and Surgery

DEAN F. F. WESBROOK

PROFESSOR THOMAS G. LEE

The College of Homeopathic Medicine and Surgery

DEAN EUGENE L. MANN

The College of Dentistry

DEAN ALFRED OWRE

The College of Pharmacy

DEAN FREDERICK JOHN WULLING

General Alumni Association

MAYOR DAVID P. JONES

University Council Committees

The University Auditing Committee

Professors Anderson, Sigerfoss, Springer, Fletcher, Owre.

The Committee on Athletics

Professors Wesbrook, Paige, Brooke, West, Harding.

The Committee on Grounds and Sanitation

Professors Wesbrook, Reynolds, Bass, Flather, Sideaer.

The Committee on Catalogue, Programs and Courses of Study

Professors Frankforter, McVey, Pattee, Jones, Snyder, Appleby, Lee

The Press Committee

Professors Schaper, Erdmann, Constant, Snyder, James.

The Committee on Commencement and other University Functions

Professors Nachtrieb, Pattee, Eddy, Lee, Owre, Washburn, Schlenker.

The Committee on Student Entertainments and Social Affairs

Professors Frankforter, Pike, White (S. M.), Bass, Willis.

The Committee on University Relations to other Institutions of Higher Learning

Professors Downey, Folwell, Green, Lee, MacMillan.

The Committee on University Extension and University Lectures

Professors James, MacMillan, Mann, Hecker, McVey.

The Committee on the Library

Professors Eddy, Downey, Jones (D. P.), West, Lee, Jones (F. S.), Fletcher.

CALENDAR FOR 1906-1907

1906

1907

JULY

S.	M.	T.	W.	T.	F.	S.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31
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AUGUST

..	1	2	3	4
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	..
..

SEPTEMBER

..	1
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23	24	25	26	27	28	29
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OCTOBER

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31
..

NOVEMBER

..	..	..	..	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	..
..

DECEMBER

..	..	..	..	..	..	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31

JANUARY

S.	M.	T.	W.	T.	F.	S.
..	..	1	2	3	4	5
6	7	8	9	10	11	12
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20	21	22	23	24	25	26
27	28	29	30	31
..

FEBRUARY

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MARCH

..	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
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24	25	26	27	28	29	30
31

APRIL

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28	29	30
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MAY

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19	20	21	22	23	24	25
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..

JUNE

..	1
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16	17	18	19	20	21	22
23	24	25	26	27	28	29
30

University Calendar, 1906-1907

THE UNIVERSITY YEAR

The University year covers a period of thirty-eight weeks beginning on the second Tuesday in September. Commencement day is always the second Thursday in June.

FIRST SEMESTER

SEPTEMBER	10 M	Entrance examinations and registration	
	11 T	Entrance examinations and registration	
	12 W	Entrance examinations and registration	
	13 Th	Entrance examinations and registration	
	14 F	Entrance examinations and registration	
	15 S	Examinations end and registration completed....	1 w
	17 M	Classes called for regular work (First College classes organized, 1869)	
	22 S	.....	2 w
	29 S	.....	3 w
OCTOBER	6 S	.....	4 w
	13 S	.....	5 w
	20 S	.....	6 w
	27 S	.....	7 w
NOVEMBER	3 S	.....	8 w
	10 S	.....	9 w
	17 S	.....	10 w
	24 S	.....	11 w
	29 T	Thanksgiving Day Recess three days	
DECEMBER	1 S	.....	12 w
	8 S	.....	13 w
	15 S	.....	14 w
	22 S	Holiday recess begins (no classes).....	15 w
	25 T	Christmas Day	
JANUARY	1 T	New Year's Day	
	8 T	Work resumed in all departments	
	12 S	.....	16 w
	19 S	.....	17 w
	28 M	Semester Examinations VII and VIII hour classes.....	18 w
	26 S	Semester Examinations I hour classes	
	29 T	Semester Examinations II hour classes	
	30 W	Semester Examinations III hour classes	
	31 Th	Semester Examinations IV hour classes	
FEBRUARY	1 F	Semester Examinations V hour classes	
	2 S	Semester Examinations VI hour classes	

SECOND SEMESTER

FEBRUARY	4 M	Second semester begins—Classes called for regular work	
	9 S	.....	1 w
	12 T	Lincoln's birthday—Holiday	
	16 S	.....	2 w
	18 M	University Charter, 1868. General Sibley died 1891.	
	22 F	Washington's birthday—Holiday	
	23 S	.....	3 w
MARCH	2 S	.....	4 w
	9 S	.....	5 w
	16 S	.....	6 w
	23 S	.....	7 w
	30 S	.....	8 w
APRIL	6 S	.....	9 w
	13 S	.....	10 w
	20 S	.....	12 w
	27 S	.....	13 w
MAY	4 S	.....	11 w
	11 S	.....	14 w
	18 S	.....	15 w
	25 S	.....	16 w
	27 M	Senior examinations begin	
JUNE	1 S	.....	17 w
	3 M	Semester examinations. I hour classes	
	4 T	Semester examinations. II hour classes	
	5 W	Semester examinations. III hour classes	
	6 Th	Semester examinations. IV hour classes	
	7 F	Semester examinations. V hour classes	
	8 S	Semester examinations. VI hour classes	18 w

COMMENCEMENT WEEK 1907

SUNDAY	June 9	Baccalaureate Service
MONDAY	June 10	Senior Class Exercises
TUESDAY	June 11	Sigma Xi Address. Senior Promenade
WEDNESDAY	June 12	Alumni Day
THURSDAY	June 13	Commencement Day—The Thirty-fifth Annual Commencement
FRIDAY	June 14	Summer Vacation Begins

PROGRAM OF EXAMINATIONS, SEPTEMBER, 1906

THE COLLEGE OF SCIENCE, LITERATURE AND THE ARTS
 THE COLLEGE OF ENGINEERING AND THE MECHANIC ARTS
 THE SCHOOL OF MINES
 THE COLLEGE OF LAW
 THE SCHOOL OF CHEMISTRY.

The numbers placed after the subjects, when given, indicate the rooms in which the examinations will be held.

—DAY—	—HOUR—	SUBJECTS FOR ADMISSION TO THE— FRESHMAN CLASS
Monday, September 10,	8:00—10:30	¹ Elementary Algebra.
	10:45— 1:15	¹ Higher Algebra
	2:30— 5:00	¹ Plane Geometry
Tuesday, September 11,	8:00—10:30	¹ Solid Geometry
	10:45— 1:15	² All History Subjects.....17
	2:30— 5:00	² Civics .....16
Wednesday, September 12,	2:00— 5:00	¹ Geology .....18
		³ Physiography .....18
		² Commercial Geography .....16
		⁶ Drawing .....24
Thursday, September 13,	8:00—10:30	⁶ Shop Work .....16
		² Political Economy.....16
	10:45— 1:15	¹ German
	2:30— 5:00	¹ French
		¹ Latin Grammar
Friday, September 14,	8:00—10:30	¹ Greek
		¹ Cæsar
	10:45— 1:15	¹ Cicero
		¹ Virgil
	2:30— 5:00	⁴ Chemistry
		⁶ Physics
		³ Botany .....B
		³ Zoology .....29
		¹ Astronomy .....35

¹ Place to be announced; ² Library Building; ³ Pillsbury Hall; ⁴ Chemical Laboratory; ⁶ Physics Building; ⁶ The Shops.

Equipment

GROUNDS AND BUILDINGS

The University campus comprises about forty-five acres lying between University avenue and the river and between Eleventh and Nineteenth avenues Southeast. The campus is well wooded with a fine growth of native oaks and commands a beautiful view of St. Anthony Falls and the city, but is sufficiently removed from the business center of the city to insure desirable quiet and retirement. The buildings upon the campus number twenty, and are valued at over \$800,000. A special clinical building for the use of the department of medicine is located in the southern part of the city, where there is an abundance of clinical material, and within easy reach of the University. The campus is valued at about \$450,000 and the equipment of the buildings at about \$300,000.

The State Experimental Farm, upon which are located the buildings of the experiment station and the department of agriculture, consists of over two hundred and fifty acres of very valuable land, half way between the twin cities and within a thirty-minutes' ride of either city. The farm is valued at \$400,000, and the sub-stations located at Crookston and Grand Rapids, at \$30,000 more. The buildings and equipment of the department of agriculture are valued at over \$400,000.

NEW BUILDINGS.

The Legislature of 1905 appropriated \$350,000 for the erection of a "Main Building," of which \$200,000 is available in 1906, and \$150,000 will be available in 1907: this amount will be supplemented by \$60,000 received from insurance on the Old Main Building, destroyed by fire in September, 1905. This will give a total for building and equipment of \$410,000.

The building is now in process of construction. It will be 322 feet in length and three stories in height above the basement, with rooms

arranged on both sides of straight halls extending through the length of the building. It will provide class and seminar rooms, and offices for the departments of Astronomy, Mathematics, Greek, Latin, German, French, and Spanish, Scandinavian, Comparative Philology, Rhetoric and Oratory, Philosophy and Psychology, and Education. It will also contain the Scandinavian Museum, German Museum, Psychological Laboratory, Dean's Office, Faculty Parlor, Postoffice, Hall for Literary Societies, Men's Study Hall, Women's Study Hall, Minnesota Daily, Minnesota Magazine, Gopher, Cloak Rooms, Janitors' Rooms, Toilet Rooms, Work Shop, and Store Rooms.

The material is brick with cut stone trimmings.

The Legislature of 1903 appropriated the sum of \$100,000 for the erection of a building for pathology, bacteriology and hygiene. The building, which is known as the Institute of Public Health and Pathology, has been erected with the general group of medical buildings and will be ready for occupancy for the year 1906-07. It is 213 feet long by 100 feet deep in the central portion and consists of the central main portion, 60x100 feet, with north and south wings each 56x75 feet.

Space is provided on three floors for a museum and library. A Pasteur Institute is housed in this building for the treatment of and research in hydrophobia. The two large laboratories for teaching pathology, bacteriology and public health and numerous offices, private and research laboratories and a large amphitheatre are arranged with special attention to efficiency and convenience. The State Board of Health Laboratories are housed here in the end of the building adjacent to the special laboratory built by that Board some years ago. Photographic laboratories, workshops, cold storage and autopsy rooms are provided.

GIFTS MADE TO THE UNIVERSITY.

The will of the late Mrs. A. F. Elliott, formerly of Minneapolis, but more recently of California, left a bequest to the University, from which the Regents expect to realize at least \$125,000.00. The heirs have requested that this fund be used to erect a Hospital in connection with the Medical Department of the University.

The Hon. Thomas H. Shevlin has donated to the University \$60,000 for a "Woman's Building," to be known as the "Alice Shevlin Hall." The gift has been accepted by the Regents, and the building is now being erected on the site of the "Old Main" between the Library and Law buildings. It will be a two-story and basement structure, the material used being pressed brick with stone trimmings. It will have a frontage of 114 feet on Pillsbury Avenue and a depth of 55 feet. The purpose of this

building is to furnish suitable rest and study rooms for the women attending the University. The building will contain several Society Rooms, a large Lunch Room, and a general Reception Hall, all of which are greatly needed. It is expected that the building will be ready for occupancy at the commencement of the next college year, September 1st.

THE FINANCIAL MANAGEMENT OF THE UNIVERSITY.

The financial management of the University is in the hands of the "Board of Regents," except in the erection of new buildings, the purchasing of fuel, and the placing of insurance on buildings and contents, which are in the hands of the State Board of Control.

UNIVERSITY REVENUES.

The sources of the University income for Current Expense are three, viz: 1st, the United States Government; 2nd, the State, and 3rd, the University.

The U. S. Government gave to each of the States certain lands for educational purposes. The proceeds of these lands, as fast as sold, are invested in state bonds. These bonds are known as the University permanent fund, and at present amount to \$1,400,000. The annual interest on these bonds is at present about \$53,000. In addition to the interest on bonds, the University receives from the government the Hatch Bill appropriation of \$15,000.00, an appropriation for the benefit of the Experiment Station, and the Morrill Bill appropriation of \$25,000.00, an appropriation for the encouragement of the Departments of Agriculture, Mechanic Arts, and Military Science.

RECAPITULATION.

Interest on Bonds and land contracts.....	\$53,000.00	
U. S. Government, Hatch Bill appropriation.....	15,000.00	
U. S. Government, Morrill Bill appropriation.....	25,000.00	
Total from the Government		\$ 93,000.00
The University receives from the State an appropriation of 23-100 of one mill per dollar on a valuation of \$846,000,000, which will give about	\$194,000.00	
A flat appropriation called a deficiency appro. of..	60,000.00	
An appropriation for support of School of Mines..	5,000.00	
An appropriation for salaries of Mines and Elec. Eng.	4,500.00	
Total from the State		\$263,500.00

Amount received from Student's fees.....	\$126,000.00
Dental Infirmary receipts	12,000.00
Station & School, sales and fees	14,000.00
Miscellaneous Receipts, University	2,000.00
<hr/>	
Total from University	\$154,000.00
Total estimated current expense receipts for	
1906	\$510,000.00

LIBRARIES

The following libraries are easily accessible to the University students: Minneapolis—The University Libraries, 110,000 volumes; the Public Library, 135,000 volumes; the Minneapolis Bar Association, the Guaranty Loan Law, and the New York Life Insurance Law Libraries, numbering a total of about 30,000 volumes, are open under certain restriction to law students; the Minnesota Academy of Natural Sciences, 12,000 titles.

St. Paul—The State Historical Library, 78,000 volumes; the State Library, 35,000 volumes; Public Library, 55,000 volumes.

The University Library consists of:

1. *The General Library.*
2. *College Libraries*, including those in Law, Medicine, Engineering, Agriculture.
3. *Departmental Libraries*, including those in Art, Astronomy, Animal Biology, Botany, Chemistry, French, Geology, German, Greek and Latin, Histology and Embryology, History, Mathematics, Military Science, Pathology and Bacteriology, Pedagogy, Physics, Physiology, Rhetoric, Scandinavian.

The private collections of professors are available when necessary for research.

The whole number of bound volumes owned by the University is about 115,000. Unbound books and pamphlets, about 30,000. About 500 current periodicals are received in the general and other libraries.

The departmental libraries consist mainly of books of reference and current periodicals relating to technical subjects.

The general library is open to students and the public from 8:00 a.m. to 9:30 p.m., every day of the University year, except Sundays and legal holidays.

The Law Library contains nearly all the English Reports, including those of Canada, from the earliest decisions down to the year 1900; nearly all the reports of the different states of the Union; all the reports of the United States Supreme court, and all the Federal Court reports. It contains also the digests of these reports and an excellent selection of standard text-books and law dictionaries.

The Nelson Law Library is a rare collection of fifteen hundred volumes, donated to the University by the Honorable R. R. Nelson, of St. Paul, upon retirement from the Federal bench. It contains many old English reports, in addition to those already mentioned, and many ancient treatises upon common law.

A rare and unique addition to the Law Library has been secured by the donation of Judge Collins and former Attorney-General Childs to the University of all the Briefs and Paper-Books in the cases argued in the Supreme Court of Minnesota since 1888, making a fine collection of over five hundred bound volumes.

The Medical Library contains a large and well assorted collection of books, sets of journals, bound and unbound pamphlets, relating to all branches of medicine. All of the leading medical journals are on file in the reading room. The various laboratories have also reference libraries devoted to their special lines of work.

The library was greatly enriched by the bequest of the late Dean, Perry H. Millard, M. D., who bequeathed his entire private medical library to the department. This collection consists of several hundred volumes and pamphlets, including many rare and old medical works, sets of journals especially rich in surgical works.

To all these library facilities may be added the Minneapolis Public Library, which is within easy reach of the University and is opened freely to the students of the University. This library contains over one hundred twenty-five thousand bound volumes and over fourteen hundred of the leading newspapers, magazines and periodicals of the world.

MUSEUMS.

The museums of the University contain material obtained from various sources, arranged with special reference to its use for illustration. Among the more notable collections are the following:

(a) *In Geology and Mineralogy.* The Kunz collection of minerals, purchased of George F. Kunz; several suites of crystalline rocks secured from various sources; The Ward collection of casts contributed in part by citizens of Minneapolis; collections of the rocks, fossils, minerals and economic products of Minnesota; upwards of 9,000 entries gathered by the geological survey of the State; the Sardeson collection of paleozoic fossils of Minnesota, Wisconsin, Iowa and neighboring states, comprising 30,000 specimens; a series of 3,000 thin sections of typical rocks and minerals largely representing Minnesota localities; purchased material comprising a fine collection of crystals; 5,000 minerals and 3,000 specimens of economic minerals and crystalline rocks, and a collection of over 4,000 photographs and lantern slides.

(b) *In Zoölogy*: All the material collected by the State Zoölogist, a collection of mounted Minnesota birds representing about one-third of the species found in the State; a number of the mammals of the State and a few from the more western states; a collection of fishes, molluscan shells, corals and other foreign material.

The ornithological room contains the excellent Thomas S. Roberts and Franklin Benner collection of skins, nests and eggs of Minnesota birds. Other groups of animals are more or less numerously represented, and are receiving annual additions from the Zoölogical Survey.

(c) *In Botany*: The general herbarium numbering about 25,000 specimens and comprising the series of plants collected by the State Botanist; an alcoholic collection of material for dissection; a collection of woods of Minnesota; a limited series of carboniferous and cretaceous fossil plants, including the Lesquereaux collection from the Minnesota River localities.

(d) *In Technology*: A cabinet of specimens illustrating the products and processes of applied chemistry is being collected by the Professor of Chemistry, as opportunity offers. The collection embraces fuel, ores, furnace products, textile materials, both raw and manufactured, dyewoods and other materials used in dyeing; specimens illustrating the bleaching and printing of cotton, linen and woolen goods, earthenware, pottery. etc.

(e) *In Classics*: Some material illustrating classical geography, topography, chronology, mythology, archaeology, and art has been collected, consisting mainly of plans and charts, casts, pictorial illustrations, facsimiles of manuscripts and inscriptions.

(f) *In English*: A few fac-similes of manuscripts, plates that may serve for the purpose of archaeological instruction, publication of texts, reprints of blackletter books and of original editions, photographs and portraits have been gathered.

(g) *In Civil Engineering*: The department is collecting samples of road material typical of the various localities of the State, and leading materials used in street paving, such as granite, trap rock, brick and asphaltum. A set of standard sections of steel and wrought iron is provided for illustration in the study of structural design..

(h) *In Mechanical Engineering*: The collection consists of models of mechanical motions especially relating to the work in kinematics; sectioned apparatus, such as injectors, water meters and steam separators; various collections of drop forging in iron, steel and copper; miscellaneous samples of commercial work representing the product of special machines; groups of standard nuts, bolts and screws; samples of belting, ropes, steel and iron cables, rawhide gears, and other material especially useful for illustrative purposes.

(i) *In Electrical Engineering Museum*: This museum contains a growing collection of samples furnished by various manufacturers and dealers for demonstrating the merits of different products and for illustrating modern practice; an excellent collection showing the development of electrical instruments, lightning arresters, switches, primary and secondary batteries, early forms of dynamos and motors, lighting apparatus and various industrial applications of electricity; also a collection of samples from repair shops and elsewhere, illustrating the effects of wear, accidents and abuse.

(j) *In Engineering Mathematics*: This department has recently added to its apparatus used for illustration in teaching, several types of slide rules, including those of Thatcher, Faber, Keuffel and Esser, Schureman's Computer, Boucher's Calculator; also Amsler's Polar Planimeter.

In Mathematics: The Schroeder wooden and the Schilling gypsum, string and paper models for Solid Analytical Geometry, many of the Schilling models for illustrating the Theory of Surfaces, several of the Schilling mechanical devices for describing various loci, the Keufel and Esser models for Solid Geometry, and large slated globes, suitably mounted, for use in Spherical Geometry and Spherical Trigonometry.

ASTRONOMICAL OBSERVATORY.

The students' astronomical observatory contains a ten and one-half inch combined, visual, photographic and spectroscopic refracting telescope, constructed by Warner Swasey and Brashear; a photographic clock.

GYMNASIUM.

The Gymnasium is located in the Armory, and is well equipped with a variety of gymnastic appliances. The object of the Gymnasium is to provide all of the students of the University opportunity for exercise to build up their general health. It also provides special training to correct physical defects and functional derangements. The gymnasium is in charge of a professional Medical Director and Assistant and the training is under their direct supervision. A thorough physical examination is offered each student immediately before and after the gymnasium course, and a record is made of the same. The examination of these records shows a marked improvement in the standard of health of the average student during his college course. The Gymnasium is open at all times to all young men in the University who are free to use the apparatus and to pursue a course of physical training under the direct supervision of the Director and his assistant. In some of the Colleges of the University, this work is required of all men.

Organizations and Publications

RELIGIOUS.

The Students Christian Association was organized in 1869, its object being to promote growth in Christian character, and to engage in such religious work as may be deemed expedient and necessary.

The Association owns a commodious building, which serves as the headquarters for student religious activity. All persons in sympathy with the object of the association are eligible to membership.

The Young Men's Christian Association has as its object the promotion of "growth in grace and Christian fellowship among its members and aggressive Christian work, by and for students." This association leases the Students' Christian Association building and keeps it constantly open, with a General Secretary in charge. All men in sympathy with the object of the association are eligible to membership. This building is maintained as the social and religious headquarters of all young men in the University.

This Association also provides an employment bureau whose services are free to students in all departments of the institution, as well as a committee to help students to find comfortable rooms and boarding places. The Association also maintains an educational department in which students may make up their entrance conditions at a nominal charge for instruction.

The General Secretary will be pleased to correspond with any young man intending to come to the University. Any inquiry about board, room, employment, or general information will gladly be answered, and a handbook will be sent to anyone wishing it. Address the General Secretary of the Young Men's Christian Association, University of Minnesota, Minneapolis, Minnesota.

The Young Women's Christian Association is the center of Christian life among the young women of the University. Its object is "to deepen spiritual thought in the University woman, to environ her with a semblance of home, to bring to her friendship, assistance and sociability by stimulating student fellowship, to give her personal help when necessary; thus developing in her the Christ ideal of culture in womanhood."

To this end frequent socials and informal teas are given throughout the year; twice each week twenty minute prayer meetings are held, a dozen circles meet one hour a week for devotional Bible study; and from time to time missionary meetings are held. The General Secretary

devotes all of her time to the Association and will be pleased to correspond with any young woman who wishes information regarding the University.

All young women are invited to visit the Young Women's Christian Association room before registering. Women from the upper classes will be there during the opening days to give advice and assistance.

Any inquiry about board, room, employment, or general information will gladly be answered by Miss Agnes Crounse, '07, 3840 Richfield Ave., Minneapolis.

The University Catholic Association was organized by the Catholic students in the spring of 1900. The purpose of the Association is the study of the Bible and of the doctrines and history of the Catholic Church. Membership is open to any one connected with the University. Regular meetings are held every Sunday afternoon in the rooms of either the Young Men's or the Young Women's Christian Association, through the courtesy of those organizations. The Association is planning to erect a building on or near the campus at an early date.

Aside from the religious objects, the Association tends to promote good fellowship among its members. Early in each University year a reception is tendered to new students and during the year two or more socials are held.

Further information may be obtained by addressing the Secretary of the Association at the University.

DEBATE AND ORATORY.

Literary Societies.—The literary societies are mainly debating clubs. Every student is welcome to attend the literary sessions, but the business sessions are usually held behind closed doors. Students desiring to join should make early application to some member of the society he prefers, as the membership is limited.

The Minnesota Literary Union—Is a federation of the members of the following societies: Shakopean, Forum, Castalian, Minerva and Arena. Four meetings are held each year.

Membership Limit: *Shakopean*, 35, men; *Forum*, 30, men; *Minerva*, 30, women; *Law Literary*, unlimited, law students; *Castalian*, 35, men; *Theta Epsilon*, 30, women; *Thalian*, 25, women.

The Debating Board has charge of home and inter-collegiate oratorical contests.

The Northern Oratorical League is composed of the oratorical associations of the University of Michigan, Northwestern University, the University of Wisconsin, Oberlin College, the State University of Iowa, the University of Chicago, and the University of Minnesota. Its purpose is to foster an interest in public speaking and to elevate the stand-

ard of oratory by holding annual contests. The contests are open only to undergraduates.

The Iowa-Minnesota League is composed of the two universities and holds an annual contest in debate.

The Central Debating League is composed of the debating associations of the University of Michigan, the University of Minnesota, Northwestern University, and the University of Chicago. Its purpose is to discuss in public leading questions of the day and in this way to develop ready and forceful speakers.

The four universities are arranged in two groups for the semi-final debates, which are held the second Tuesday in January. On the first Friday in April in each year, the winners from the groups meet in a final debate in the city of Chicago.

The University competes annually for the *Hamilton Club* prize. Michigan, Minnesota, Wisconsin, Iowa, Ohio, Indiana, Northwestern and Chicago Universities and Knox College constitute the league. Each of the colleges named submits one oration upon Alexander Hamilton or some character or event connected with his time. From the orations submitted four are chosen to be delivered before the Hamilton Club.

MUSICAL, SOCIAL AND OTHER ORGANIZATIONS.

The Women's League is an organization of the women of the University for mutual helpfulness and sociability.

The Dramatic Club is organized for the study and practice of dramatic art. One or more plays are put on the stage each year.

The Glee and Mandolin Clubs give a public concert each year at the University and make a tour of the state during the holidays.

The University Band is organized as a part of the military system of the University and is composed of about sixty musicians. It is under the efficient leadership of an Instructor in Music, and furnishes music for military and many other University affairs.

LITERARY AND SCIENTIFIC ORGANIZATIONS.

Phi Beta Kappa.—A chapter of the honorary society of *Phi Beta Kappa* was established at the University in 1892. A small proportion of the graduates of the College of Science, Literature and the Arts are elected to membership each year. Election is based upon high scholarship and character.

The Philological Society.—The object of the Philological Society is to promote philological investigation and study.

Greek Club is a society composed of professors, students and alumni

of the Department of Greek for the study of Greek life, language and customs.

Societas Latina is a society in the Department of Latin, having for its special aim the securing of greater proficiency in reading and writing Latin.

The Scandinavian Literary Club is an organization whose purpose is to promote interest in the study of Scandinavian literatures.

The Philosophical Club meets bi-weekly in the evening during the winter months to read and discuss contemporary philosophy. The membership consists of the professors, instructors, and qualified students of the department.

The Economic Club meets twice a month for debate in economic and political subjects.

The Graduate Club is a club organized for the purpose of fostering a greater interest in graduate work, for mutual help, and for the discussion of topics under investigation.

The University Liberal Association is an organization of students and faculty members formed for the discussion of topics of broad and current interest. It meets twice a month, usually on Saturday evening.

Sigma Xi.—A chapter of the honorary scientific society of *Sigma Xi* was established at the University in 1896. A small proportion of the graduates of the scientific, and technical department are elected to membership each year. Election is based upon high scholarship and character.

American Chemical Society.—A local section of the American Chemical Society has been organized in Minnesota with headquarters at the University.

The Camera Club is an organization of instructors and students interested in photography and photographic chemistry.

The Geological Club is an organization of instructors and students interested in geology, for the discussion of geological problems.

The Botanical Students' Journal Club is an organization of juniors, seniors and graduate students, of the Department of Botany, for the review of current botanical literature.

The Zoological Journal Club for instructors and advanced students who meet for the discussion of current zoölogical literature.

The Zoological Reading Club meets evenings at the homes of the professors and is for instructors and graduate students. Its purpose is the reading and discussion of philosophical works on Zoölogy.

The Physical Colloquium is composed of instructors and graduate students and meets for the discussion of recent investigations in physical science.

The Society of Engineers meets once in two weeks to listen to addresses by prominent engineers and for the discussion of various

engineering topics. The Year Book of this society is published annually. It is devoted to the publication of articles upon engineering subjects by professors and students in the College of Engineering and the Mechanic Arts.

The Mining Society is an organization of mining engineering students who meet for the purpose of hearing lectures and discussing mining engineering problems.

The Mathematical Society is composed of professors, assistant professors and instructors whose work is in Pure or Applied Mathematics, and meets the third Wednesday of each month for the discussion of mathematical subjects.

PUBLICATIONS.

The University Bulletins are published by authority of the board of Regents twelve times a year—every four weeks during the University year. Bulletins will be sent gratuitously, postage paid, to all persons who apply for them.

The Minnesota Alumni Weekly is published every Monday during the University year. The Weekly is published entirely in the interest of the alumni and is devoted to alumni news and such University news as may be of special interest to the alumni.

The Minnesota Daily is published five times each week during the University year by an organization of University students.

The Yearbook of the Society of Engineers is published annually by the engineering students.

The Junior Annual, called the "Gopher," is a book published annually by the junior class of the University.

The Minnesota Magazine is a monthly magazine devoted to the cultivation of literary taste and effort among the students of the University. It is managed by a board of editors chosen from the senior class.

ATHLETICS.

The Athletic Association is an organization having for its object the general physical well-being of the students and the encouragement of a proper spirit in favor of hearty, manly sports.

Control of Athletics. The athletic sports of the University are under the supervision of a Board of Control made up of eleven members; two are members of the faculty, two are alumni and seven are students. This board has general supervision of all matters connected with athletic contests and arranges the schedule of games. It is the purpose of the board to foster a spirit in favor of fairness and honesty in all athletic contests.

Northrop Field is an enclosed athletic field containing about six acres, immediately adjoining the armory. It is surrounded by a high brick wall, the gift of A. F. Pillsbury, and is one of the finest athletic fields in the country.

Scholarships and Prizes

UNIVERSITY SCHOLARSHIPS

It is the policy of the University to establish scholarships in the different departments, where extra help is needed for instruction, under regulations somewhat as follows:

1. The appointments are made by the Executive Committee of the Board of Regents, upon the recommendation of the department in which the appointment is desired, after approval by the General Faculty.

2. Recipients of scholarships may be either graduate or undergraduate students.

3. The scholarships are not intended as gifts or benefactions from the state to the recipients, but as provisions under which services may be rendered the University.

4. It is understood that these services are of a nature which shall assist the holder of a scholarship to attain the mastery of some line of work in the department to which he is appointed.

ENDOWED SCHOLARSHIPS

THE MOSES MARSTON SCHOLARSHIP IN ENGLISH.

Friends and pupils of the late Professor Marston, Ph. D., have given and pledged one thousand dollars as a memorial fund. The annual income of the fund is to be used to help some student in the long English course. The award of the income is made on the basis of pecuniary need and of deserving scholarship.

THE ALBERT HOWARD SCHOLARSHIP FUND.

Under the last will and testament of Mr. James T. Howard, of the town of St. Johnsbury, Vermont, \$4,166.81 was left to the University to establish a scholarship to be known as the "Albert Howard Scholarship." This scholarship is assigned by the Executive Committee upon the recommendation of the General Faculty.

STUDENT LOAN FUNDS

THE ELLIOT SCHOLARSHIP LOAN FUND.

To fulfill the wish of the late Dr. A. F. Elliot to aid young men who find their efforts to obtain a practical education embarrassed through lack of means, the income of \$5,000, amounting to \$250 per year, is placed in the hands of the Board of Regents to be used as a scholarship loan fund for assisting young men in the school of mines.

The conditions of granting the scholarship loans are: The financial needs of the applicant, his scholarship, moral character, enthusiasm shown in his work and promise of usefulness in his profession. When money is available it may be loaned to pay expenses of worthy students during sickness. The loans are to repaid, without interest, at the earliest convenience of the recipients.

THE GILFILLAN TRUST FUND.

The Honorable John B. Gilfillan has given to the University the sum of fifty thousand dollars, yielding an annual income of two thousand dollars, to be used by the Board of Regents to assist worthy students, needing such aid, to secure an education. The Regents are empowered to give this aid in the way of loans or gifts, according to the circumstances of the case. As a rule the fund is used as a loan fund, and a small rate of interest is charged. The details of the regulations which have been adopted by the Regents for the administration of the fund may be learned by addressing the President of the University.

PRIZES.

THE PILLSBURY PRIZE.

Three prizes of \$100, \$50 and \$25, offered by the heirs of the Hon. John S. Pillsbury, are awarded for the best work in the Department of Rhetoric, as evidenced finally by an oration in public.

THE '89 MEMORIAL PRIZE IN HISTORY.

The class of 1889, at graduation, established a prize of \$25 each year, to be known as the '89 Memorial Prize, and to be given for the best thesis in history. The award is made by a Professor of History in some other institution.

THE DUNWOODY PRIZE.

Mr. William H. Dunwoody, president of the St. Anthony and Dakota Elevator Company, has provided a cash prize of \$75 for the members of

the team winning the inter-sophomore debate, and another prize of \$25 for the student in the sophomore class writing and delivering the best oration.

THE PEAVEY PRIZE.

Mrs. Heffelfinger continues the prize of \$100, established by her father, the late Frank H. Peavey. This prize consists of \$75 for the members of the team winning the freshman-sophomore debate, and another prize of \$25 to the student in the freshman or sophomore class writing and delivering the best oration.

THE WYMAN PRIZE.

A prize of fifty dollars is offered by the Honorable James T. Wyman, of Minneapolis, through the department of political science, for the best essay of three to five thousand words by an undergraduate student, on the subject of "The Influence of Immigration upon the Development of the Northwest."

THE WILLIAM JENNINGS BRYAN PRIZE.

The Hon. William Jennings Bryan has given the University the sum of \$200.00 for the encouragement of studies in political science. The annual income will be given as a prize to the writer of the best essay upon a topic to be announced each year. The competition is open to all students of the College of Science, Literature and the Arts.

THE BRIGGS PRIZE IN FOUNDRY PRACTICE.

For the encouragement of studies in foundry practice, Mr. O. P. Briggs, Commissioner of the National Foundrymen's Association, Detroit, Mich., offers \$75 annually, in two prizes, which are to be accompanied by gold medals. The competition is open to sophomores in the College of Engineering, and the prize will be awarded for the best essay relative to the above subject. No prize will be awarded if less than five essays are submitted in competition. Essays should contain about 3,000 words, and must be submitted to the Professor of Rhetoric on or before May 1st.

THE LOWDEN PRIZE.

Mr. Frank O. Lowden, of Chicago, offers as a prize to be competed for by the Northern Oratorical League, an endowment of \$3,000, which will yield an annual income of about \$175. A prize of \$100 will be given

to the winner of the first place, \$50 to the orator who gets second place, and the remainder will be set aside each year for an interest fund to accumulate, and, in time, produce another endowment.

MINNEAPOLIS LIFE UNDERWRITERS ASSOCIATION'S PRIZE.

A prize of fifty dollars is offered by the Minneapolis Life Underwriters Association for the best essay on life insurance written by a senior of the class of 1906. Essays should contain at least 3,000 words and be presented to the Professor of Political Economy on or before May 21, 1906.

THE ROLLIN E. CUTTS PRIZE IN SURGERY.

Dr. Mary E. Smith Cutts, '91 Medical, has given the University, as a memorial of her husband, Dr. Rollin E. Cutts, '91 Medical, the sum of \$500.00, the income from which is to be awarded in the form of a gold medal to that member of the senior class of the College of Medicine and Surgery who presents the best thesis showing original work upon a surgical subject.

General Information

THE ONE-MILE LIQUOR LAW.

A state law provides that "it shall be unlawful for any person to sell or dispose of any spirituous, vinous, or malt liquors within the distance of one mile of the Main Building of the University of Minnesota, as now located in the city of Minneapolis; provided, that the provisions of this section shall not apply to that part of the city of Minneapolis lying on the west side of the Mississippi River."

MILITARY DRILL.

The act of Congress of 1862, providing for the establishment of "Land Grant Colleges," requires that instruction be given in Military Science and Tactics at all institutions that are its beneficiaries. The Armory is located on the University campus and has all the facilities usually provided in a modern Armory. The United States Government supplies the University with the necessary arms, equipment and ammunition for instruction in infantry and artillery drill, and details a commissioned officer of the regular army to take charge of the department.

EXPENSES OF STUDENTS.

Several years ago a number of young men and women, at the request of University officials kept careful account of their expenses for the University year. The result was that the expenses of the young men ranged from \$217.00 to \$397.00. The same students earning sums varying from \$237.00 to \$272.00. The young women reported expenses varying from \$150.00 to \$355.00. These figures do not include fees, and, as the cost of living has increased decidedly, probably 25 per cent should be added to these figures to make them safe.

The students upon whose statements these figures are based were representative students; they were not extravagant nor did they deny themselves unduly to get along. While students can live within the figures given above, they would not, owing to the increased cost of living, be able to live as comfortably nor to have as many privileges as these students had.

Board can be had at prices ranging from \$2.10 to as high as the student

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can afford to pay. In private families board ranges from \$3.00 to \$5.00.

Furnished rooms vary in price from \$8 to \$20 per month. Two students rooming together would of course reduce this expense. It is sometimes possible for a student, rooming alone to secure a good room at an expense but little higher than when two room together; but such chances are the exception and not the rule. New students will find that they will be more likely to secure comfortable rooms and suitable board if they will consult the general secretary of either the young men's or young women's Christian association immediately upon arrival at the University, or if they will correspond with these officers before coming to the University.

The student who learns some trade before coming to the University has a great advantage over the student who has to earn his money by ordinary manual labor. Students have earned their whole expenses while attending the University, and have made good records at the same time. Other students have done so much work that they have not been able to keep up their studies, and have thus missed the one thing for which they were attending the University.

If it is possible for the student to have a part of his expenses paid, he should not attempt to earn his way entirely by his own exertions. It is a comparatively easy thing for a young man to earn half his living while attending the University and yet do good work in his classes. Students who want work seldom fail to find it. In coming to the University, the student should bring enough money with him so that he can live comfortably for a few weeks until he can find something to do.

A pamphlet has been published containing five papers (one by a young woman), relating actual experience of students who have made their way through the University.

Students who contemplate making their own way through college will find here stated the stern and unpleasant side, as well as the brighter side of such a life. A copy will be sent free to any address upon application.

THE FACULTY

- CYRUS NORTHROP, LL. D., *President*, 519 Tenth Avenue S. E.
 HENRY T. EDDY, C. E., Ph. D., 916 Sixth Street S. E.
*Dean of the Graduate School, and Professor of Engineer-
 ing and Mechanics.*
- FRANK MALOY ANDERSON, M. A., 1629 University Avenue S. E.
Professor of History.
- GEORGE N. BAUER, Ph. D., Minneapolis.
Assistant Professor of Mathematics.
- CHARLES W. BENTON, M. A., Litt. D., 516 Ninth Avenue S. E.
Professor of the French Language and Literature.
- JABEZ BROOKS, D. D., 1708 Laurel Avenue.
Senior Professor of the Greek Language and Literature.
- JOHN S. CARLSON, Ph. D., 827 Seventh Street S. E.
Professor of the Scandinavian Languages and Literatures.
- JOHN S. CLARK, B. A., 729 Tenth Avenue S. E.
Professor of the Latin Language and Literature.
- FRANK H. CONSTANT, C. E., 1803 University Avenue S. E.
Professor of Structural Engineering.
- SAMUEL N. DEINARD, M. A., Minneapolis.
Assistant Professor of the Semitic Languages and Literatures.
- JOHN F. DOWNEY, M. A., C. E., 825 Fifth Street S. E.
*Dean of the College of Science, Literature and the Arts,
 and Professor of Mathematics.*
- HENRY A. ERICKSON, B. E. E., Minneapolis
Assistant Professor of Physics.
- JOHN J. FLATHER, Ph. B., M. M. E., 1103 Fourth Street S. E.
Professor of Mechanical Engineering.
- WILLIAM W. FOLWELL, LL. D., 1020 Fifth Street S. E.
*Professor of Public Finance, and Lecturer on International
 Law.*
- GEORGE B. FRANKFORTER, M. A., Ph. D., Flat 1, 602 Fourth Avenue S.
*Dean of the School of Chemistry, and Professor of Chem-
 istry.*
- EDWARD M. FREEMAN, M. S., St. Paul.
Assistant Professor of Botany.
- JOHN E. GRANRUD, Ph. D., 605 Delaware Street S. E.
Assistant Professor of Latin.
- SAMUEL B. GREEN, B. S., St. Anthony Park.
*Professor of Horticulture and Forestry, and Horticulturist
 of the Experiment Station.*

- CHRISTOPHER W. HALL, M. A., 803 University Avenue S. E.
*Professor of Geology and Mineralogy; Assistant Curator
of the Museum.*
- ARTHUR EDWIN HAYNES, M. S., M. Ph., Sc. D., 703 River Parkway.
Professor of Engineering Mathematics.
- JOHN C. HUTCHINSON, B. A., 3806 Blaisdell Avenue.
Professor of the Greek Language and Literature.
- GEORGE FRANCIS JAMES, Ph. D., 308 Eighteenth Avenue S. E.
Dean of the College of Education, and Professor of Education.
- ALBERT ERNEST JENKS, Ph. D., Minneapolis
Assistant Professor of Sociology.
- FREDERICK S. JONES, M. A., 712 Tenth Avenue S. E.
*Dean of the College of Engineering and the Mechanic Arts,
and Professor of Physics*
- WILLIAM H. KAVANAUGH, M. E., 503 Fifteenth Ave. S. E.
Assistant Professor of Mechanical Engineering.
- WILLIAM H. KIRCHNER, B. S., 618 Tenth Avenue S. E.
Assistant Professor of Drawing.
- FREDERICK KLAEBER, Ph. D., 616 Ninth Avenue S. E.
Professor of Comparative and English Philology.
- FRANCIS P. LEAVENWORTH, M. A., 1628 Fourth Street S. E.
Professor of Astronomy and Director of the Observatory.
- WILLIAM M. LIGGETT, St. Anthony Park.
*Dean of the College of Agriculture, and Director of the Ex-
periment Station.*
- HAROLD LYON, Ph. D., Minneapolis.
Assistant Professor of Botany.
- CONWAY MACMILLAN, M. A., 1004 Seventh Street S. E.
*Professor of Botany, and Botanist of the Geological and Natural
History Survey.*
- FRANK L. MCVEY, Ph. D., 621 Fifteenth Avenue S. E.
Professor of Political Economy.
- JOHN G. MOORE, B. A., 2810 University Avenue S. E.
Professor of the German Language and Literature.
- HENRY F. NACHTRIEB, B. S., 905 Sixth Street S. E.
*Professor of Animal Biology; Zoologist of the Geological
and Natural History Survey; Curator of the Zoological
Museum.*
- WILLIAM S. PATTEE, LL. D., 1319 Fifth Street S. E.
*Dean of the College of Law, and Professor of Equity and In-
ternational Law.*
- JAMES O. PIERCE, 507 Eighth Street S.
Lecturer on Constitutional Jurisprudence and History.
- JOSEPH BROWN PIKE, M. A., 525 Tenth Avenue S. E.
Professor of Latin.
- M. H. REYNOLDS, M. D., V. M., St. Anthony Park.
*Professor of Veterinary Medicine and Surgery and
Veterinarian of the Experiment Station*
- FREDERICK W. SARDESON, Ph. D., Minneapolis.
Assistant Professor of Paleontology.
- WILLIAM A. SCHAPER, Ph. D., 1009 University Avenue S. E.
Professor of Political Science.

ALBERT W. RANKIN, A. B., <i>Associate Professor of Education.</i>	916 Fifth Street S. E.
CARL SCHLENKER, B. A., <i>Professor of German.</i>	312 Union Street S. E.
GEORGE D. SHEPARDSON, A. M., M. E., <i>Professor of Electrical Engineering.</i>	Minneapolis.
CHARLES F. SIDENER, B. S., <i>Professor of Chemistry.</i>	1320 Fifth Street S. E.
CHARLES P. SIGERFOOS, Ph. D., <i>Professor of Zoology.</i>	1206 Fifth Street S. E.
SAMUEL G. SMITH, Ph. D., LL. D., <i>Professor of Sociology.</i>	St. Paul.
HARRY SNYDER, B. S., <i>Professor of Agricultural Chemistry, and Chemist of the Experiment Station.</i>	St. Anthony Park.
FRANK W. SPRINGER, E. E., <i>Assistant Professor of Electrical Engineering.</i>	1100 Fifth Street S. E.
JOSEPHINE E. TILDEN, M. S., <i>Assistant Professor of Botany.</i>	800 Fourth Street S. E.
FREDERICK L. WASHBURN, M. A., <i>Professor of Entomology, and Entomologist of the Experiment Station.</i>	St. Anthony Park.
WILLIS M. WEST, M. A., <i>Professor of History.</i>	1314 Sixth Street S. E.
ALBERT B. WHITE, Ph. D., <i>Assistant Professor of History.</i>	515 Fifth Avenue S. E.
NORMAN WILDE, Ph. D., <i>Professor of Philosophy and Psychology.</i>	901 Sixth Street S. E.
ANTHONY ZELENY, M. S., <i>Assistant Professor of Physics.</i>	321 Church St. S. E.
JOHN ZELENY, Ph. D., <i>Associate Professor of Physics.</i>	Minneapolis.

The Graduate School

This school has been established by the Board of Regents to include in a single organization the graduate work of all colleges and schools of the University, which offer courses of instruction leading to the higher degrees. The administration of the school is entrusted to the Dean, who is charged with its supervision and regulation, under the general direction of the President.

The faculty of the school consists of all those professors in the University who give courses of instruction accepted for such higher degrees as are offered by the school. Each college of the University has its graduate committee.

The Dean is chairman of the faculty and of the graduate committees of the various colleges, *ex officio*.

The aim of the school is to offer instruction and opportunity for study combined with facilities for investigation and research to graduate students who desire to pursue some one or more branches of knowledge beyond the ordinary undergraduate courses.

FEES.

All students taking full work in this school are required to pay a fee of ten dollars a semester, or a proportionate fee for less work. Members of the staff of instruction in the University may register for graduate work without payment of tuition fees. Laboratory fees are charged in addition to those just mentioned.

ADMISSION.

Any graduate from a four years' course of study in any reputable college or university will be admitted to the graduate school without examination, but will not be thereby admitted to candidacy for either of the higher degrees until his case has been duly considered and approved, as is explained later, in connection with the several degrees.

Each applicant for admission to the school should present himself in person to the registrar with his credentials, (preferably his diploma of graduation), in order to register and pay his fees.

In case of doubt respecting the sufficiency of credentials, consult the dean.

Registration at the beginning of each semester is obligatory upon graduate students and undergraduates alike.

Each student will receive at registration for entrance to the school, as well as at the beginning of each semester thereafter, a blank on which to inscribe the courses he desires to pursue. When the professors in charge of those courses shall have put their signatures upon the blank, certifying that the student is prepared to begin such of these courses as they have charge of, the registrar will issue cards authorizing the student to attend the courses thus certified to.

At the end of each semester regular reports shall be made to the registrar by the professors in charge of the various courses of the graduate students as to the amount and grade of work completed by each student during the semester, as is done in case of undergraduates.

DEGREES.

The degree of Master of Arts is, in general, conferred for advanced non-technical study; the degree of Master of Science for advanced technical study, such as agriculture, industrial chemistry, engineering, etc.; and Master of Laws for advanced legal studies.

The Master's Degree. Three degrees of this grade are conferred, viz: Master of Arts (M. A.), Master of Science (M. S.), and Master of Laws (LL. M.).

Candidacy for the Master's Degree. Any bachelor, a graduate of this university or of any other university or college with an equivalent baccalaureate course, will be enrolled by the Dean as a candidate for the corresponding master's degree on the basis of an approved course of study conforming to requirements detailed below, provided the heads of the departments in which the studies selected lie, signify their approval of the student's preparation to enter upon the work selected.

In case of inadequate preparation for the work selected, such preliminary study as the case may require will be stated by the professor in charge and will be insisted on before the applicant is admitted to candidacy.

REGULATIONS.

The master's degree will be conferred on any candidate duly enrolled for that degree, who not sooner than one year after graduation if in residence at the university, and not sooner than two years after graduation if not in residence, shall pass satisfactory final examinations on the course which was approved when he was admitted to candidacy, and shall in addition present an acceptable thesis in accordance with the following provisions:

The professor with whom the candidate pursues his major subject shall be chairman of a committee of three, having in charge the work of the candidate from the time of his enrollment as such, the other members of

the committee being those professors under whom the candidate's minors fall. This committee shall arrange for and have charge of the final examinations of the candidate; it shall approve the subject of the thesis, and pass upon the thesis itself. The candidate must secure their approval of his subject at least three months before graduation and must complete the thesis and all examinations at least two weeks before graduation. It shall be the duty of this committee to canvass the examinations of the candidate's whole course together with the thesis, and in case they regard him entitled to a degree, to report the fact to the Dean, at least one week before commencement. The chairman of the committee shall also make a final report upon the candidate to the registrar one week before commencement.

Any candidate for master's degree at commencement must, as a preliminary, make application to the Dean in writing, by the first of the preceding May, and state the courses in which he has passed and is to pass examination, the title of his thesis, and the names of the committee in charge of his work.

The amount of work required for the master's degree shall be equivalent to that done by the senior class, viz.: An average of sixteen hours per week for two semesters. Proficiency shall be determined by examination upon the subject matter of the courses taken and of the thesis.

For convenience in selecting among the various departments and subjects of study they are arranged in groups, as follows:

1. Education, History, Philosophy, Psychology.
2. Economics, Law, Political Science, Sociology.
3. Greek, Latin, Sanscrit and Semitic languages and literatures.
4. Comparative Philology, English, Germanic, Romance and Scandinavian languages and literatures.
5. Anatomy, Animal Biology, Bacteriology, Embryology, Histology, Botany, Paleontology, Physiology.
6. Agriculture, Chemistry, Geology, Mineralogy.
7. Astronomy, Engineering, Mathematics, Mechanics, Physics.

Candidates desiring a master's degree in some special line of study, for the purpose of teaching or research, or as a basis for studies leading to the doctor's degree, must select three subjects of study, a major to occupy at least eight of the sixteen hours required, a first minor to occupy at least four hours which shall be germane to the major subject by being selected from the same group or a closely related group, and a second minor to occupy at least two hours, which last shall be in some reasonable connection with the other subjects selected. In special cases the candidate may be allowed to fill the required time with a major and one minor only. The thesis in this case must embody the results of study and investigation along the line of the major subject. In attaining this specialized master's degree, the thesis is regarded of much importance, and to it

the candidate should devote much time and effort. To render this possible, the professor in charge of the major subject may count work assigned in its preparation as part of the time required in that subject.

Candidates desiring a master's degree with a view to general culture will select subjects from three distinct groups, of which the work in no one group shall be less than four hours a week, for the year. The work in one of these groups shall be designated as the candidate's major and to it the subject of his thesis shall stand in close relation. The courses pursued in the major shall be in advance of any regularly pursued by undergraduates.

The other two subjects selected shall be designated as minors.

A minor in any subject will require as a prerequisite that the student selecting it shall have pursued that subject at least one year before entering upon the course or courses of which the minor consists.

A candidate for the degree of Master of Laws must not only be Bachelor of Laws from a reputable law college having a course equivalent in length to that at the University of Minnesota, but he must in addition have been admitted to the bar in Minnesota. Any person who possesses the requisite legal learning may on registration pursue any or all of the studies offered for this degree, but he thereby acquires no standing as candidate for this degree.

The major selected for this degree will in all cases be Law, and the minors Political Science and Constitutional History.

The Doctor's Degree. Three degrees of this grade are conferred, viz.: Doctor of Philosophy (Ph. D.), Doctor of Science (Sc. D.), and Doctor of Civil Law (D. C. L.), for still more advanced study than that leading to the corresponding bachelor's and master's degrees, and such special attainments therein as show power of original investigation and independent research, together with a fair degree of literary skill as evinced by the preparation of a thesis which shall be a contribution to knowledge.

Candidacy for the Degree of Doctor. Any student in the Graduate School who applies to be enrolled as candidate for a doctor's degree must, in order to be enrolled as such, possess a reading knowledge of French and German, certified to by the professors respectively in charge of those languages, and in case of an applicant applying to be enrolled as candidate for the degree of Doctor of Civil Law, proficiency in Latin and Roman History are also required. Knowledge of Latin will also be required in certain other cases such as for a major in Medieval History, or Philosophy, as the professor in charge may prescribe.

The applicant must also have made before enrollment such noteworthy advancement in his graduate work as to secure the approval of his candidacy by his instructors. And in particular, he must obtain the written consent of the professor under whom his major subject falls to take

charge of his instruction in that subject. His minors must also be acceptable to this professor, who must recommend him to the dean as a suitable candidate for the degree sought.

In order for the application to be successful, this professor should also state that through the work thus far accomplished by the applicant, he has become convinced of his capacity and of his probable ability to carry an investigation in his special field to a successful conclusion and embody it in a valuable thesis.

The Dean shall, after full consideration and consultation with the professors concerned, pass upon his application and have power to enroll the applicant as candidate or refuse to do so.

It will frequently not be practicable to enroll an applicant as candidate for the doctor's degree before the completion of one year's study in the Graduate School. Graduates desiring to become candidates for this degree will find it advisable, under ordinary circumstances, to spend the first year of graduate study in attaining to the specialized master's degree, as part of the work leading to the doctor's degree.

That procedure is likely to furnish such a decisive test of capacity for advanced study, as well as experience in preparation of a thesis, as to definitely settle the question of candidacy for the doctor's degree.

Candidates for the degree of Doctor of Civil Law are required to secure the degree of Master of Laws as a preliminary.

REGULATIONS.

Candidates for the degree of doctor must devote at least three years of graduate study to the subjects approved for candidacy. One of these three years, viz., that in which the final examinations are held, must be spent in residence at the University of Minnesota. In lieu of the other years the candidate may offer an equivalent term of graduate study at some other university, but study pursued and work done *in absentia* without proper facilities of libraries and laboratories will not be accepted.

The same general regulations govern the candidate for this degree as hold in case of the specialized master's degree, both as regards the amount of study per year, the selection and relative amount of major and minors and as regards the chairman of the committee in charge of the work of the candidate, as well as regards the thesis required, which for this degree must give evidence of original and independent research and must be a contribution to knowledge.

In particular, considerable portions of the work on the major and on the thesis may be carried on under general direction of the professor in charge, in which case the candidate will be held responsible for large attainments in the directions indicated, in the form of written reports, reviews and criticism.

The candidate must pass satisfactory examinations upon his major and minor subjects. The committee shall indicate beforehand its requirements for final examination on the minors as to extent and proficiency. The final examinations upon the minors may occur at any time not more than a year prior to the final examination on the major.

The final examination upon the major must show an exhaustive knowledge of the special subject selected, and a large acquaintance with the general field in which the subject lies, but the candidate shall not be admitted to the final examination upon his major until his thesis has been considered by the committee in charge and found satisfactory.

The order of procedure to be followed is this: The candidate for a doctor's degree shall submit the title and outline of his proposed thesis to the professor in charge of his major for final approval at least as early as the first of October preceding the commencement at which the degree is to be conferred. In case the proposed subject and the outline are acceptable, the candidate shall make a statement in writing to the Dean, as early as the first of the following February, of his intention to present himself for a doctor's degree at the next commencement, giving at the same time the names of the committee in charge of his work, the subjects of his major and minors, and the title of his thesis.

The thesis itself shall be completed and delivered to the professor in charge at least one month before commencement. In case the thesis is adjudged satisfactory, the candidate will be admitted by the committee to final examinations upon his major, upon the subject matter of his thesis and upon such of his minors as are still incomplete.

This examination shall be arranged for by the professor in charge of the major, on a date at least two weeks before commencement. It shall be held by a committee of examination of which the professor in charge of the major shall be chairman, consisting of the professors in charge of the minors and, in addition, of such other members of the teaching force as the Dean may appoint as members of this examining committee. In order to do this, the dean shall be duly informed of the date of the examination by the chairman.

The examining committee shall decide from all the facts within its knowledge, whether the candidate is, in its estimation, entitled to receive the doctor's degree sought, and the chairman shall, without delay, report its findings, in writing, to the Dean and to the registrar.

Immediately after the final examination, the thesis shall be placed by the chairman in the president's office for general examination.

In case the report of the committee is favorable, the candidate shall be presented to the faculty of the graduate school, at a meeting called for the purpose, by the professor in charge of his major subject, who shall then make a written statement of the academic life of the candidate, of

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the character and scope of his examinations, and the scope and value of his thesis.

Any member of the faculty shall then be at liberty to propound any questions he will to the instructors of the candidate, respecting his work, or to the candidate himself, respecting the subject matter of his thesis. Upon evidence before it, the faculty shall then decide by vote whether the candidate shall be recommended for the degree.

COURSES OF INSTRUCTION

The Roman numerals by which the courses are here designated are those under which they appear in the bulletins of the separate colleges.

The courses which are offered to both undergraduates and graduates may not be selected by graduates as major subjects, but as minors only. The courses offered primarily for graduates include the subjects offered to them as majors.

ANIMAL BIOLOGY.

The details of the work of a graduate student in this department will naturally depend upon and be determined by the previous training of the student and the end in view.

FOR UNDERGRADUATES AND GRADUATES.

- II. *Zoology.* *Professor Sigerfoos.*
First and second hours on Tuesday, Thursday, Saturday. I and II prerequisite, course I.
- III. *Histology.* *Professor Nachtrieb and Instructor Downey.*
Third and fourth hours on Monday, Tuesday, Wednesday, Thursday, Friday. I. and II prerequisite, course I.
- IV. *Embryology of Vertebrates.* *Professor Nachtrieb.*
Fifth and sixth hours on Monday, Tuesday, Wednesday, Thursday, Friday. I and II prerequisites, courses I. and III.
- V. *Embryology of invertebrates.* *Professor Sigerfoos.*
Hours and days arranged with the professor. I and II prerequisites, courses I and III.
- VI. *Comparative Anatomy of Vertebrates.* *Instructor Brown.*
Fifth and sixth hours on Tuesday, Thursday, Saturday. I. and II prerequisite, course I.
- VIII. *Taxonomy.* *Instructor Brown.*
Entomology, third and fourth hours on Monday, Wednesday, Friday. I. and II. *Assistant Professor Oestlund.*
Ichthyology. Hours and days arranged with Professor Nachtrieb. I.
Ornithology. Sixth hour on Tuesday, Thursday, Saturday. II. Prerequisite, course I.
- VIII. *Physiology.* *Professor Sigerfoos.*
Fourth hour on Monday, Wednesday, Friday. I. alternates with course IX and will not be offered in 1907-8.
- IX. *Nature Study.* *Professor Sigerfoos.*
Fourth hour on Monday, Wednesday, Friday. II. alternates with course VIII. It will be offered in 1907-8.
- XI. *Neurology.* *Professor Nachtrieb and Instructor Downey.*
Third and fourth hours on Monday, Tuesday, Wednesday, Thursday, Friday. I. and II. or only I.
- XII. *Mental Evolution in Animals.* *Professor Nachtrieb.*
Fourth hour on Saturday. I. This is a course of lectures that may be taken in connection with course III. or IV.

- XIII. Economic Zoology.** *Professor Nachtrieb.*
Fourth hour on Saturday. This course of lectures is, like course XII, open to all and may be taken in connection with course III, or IV. It is alternated with course XIV and will be given in the even-numbered years; accordingly not in 1907.

- XIV. Parasitology.** *Professor Nachtrieb.*
Fourth hour on Saturday. This is a course of lectures on disease producing animals that is open to all and may be taken in connection with course III, or IV. It is alternated with course XIII and is given in the odd-numbered years.

FOR GRADUATES.

- XV. Philosophical Zoology.** *Professor Nachtrieb.*
Occasional lectures to advanced students. Problems or special advanced work. Research along such line or lines as previous training, available material and end in view may suggest. Graduate students are expected to take an active part in both the Journal Club and the Reading Club. semester may be taken as a unit. Open to those who have completed course III. Open also as a major or minor to candidates for the degree of master of science.

ASTRONOMY.

FOR UNDERGRADUATES AND GRADUATES.

- I. General astronomy.** *I, II. Professor Leavenworth.*
A study of the general principles of astronomy, illustrated by observatory work. Open to those who have completed trigonometry.
- II. Practical astronomy.** [3 or 6] *I, II. Professor Leavenworth.*
The theory of instruments, the use of the ephemeris and nautical almanac; the various methods of determining time, latitude and longitude, parallax, the position of the celestial bodies, and the method of least squares; observatory practice including photography, and spectrum-analysis. Open to those who have completed analytical geometry, calculus and general astronomy.

FOR GRADUATES.

- III. Extended course in practical astronomy.** *Professor Leavenworth.*
- IV. Orbit work.** *Professor Leavenworth.*
Computation of orbits; the determination of the orbits of planets and comets; perturbations.
- V. Astrophotography.** *Professor Leavenworth.*
The making and measuring of astronomical photographs; the determination of right ascension, declination, parallax, etc.

BOTANY.

FOR UNDERGRADUATES AND GRADUATES.

- V. Cytology.** Junior or senior *I, II. Professor McMillan and Dr. Lyon*
Laboratory work and collateral reading. The course includes a survey of cell structure and the various phenomena of division, fusion and metamorphosis, together with a review of the history of cytologic investigation from the time of Malpighi and Grew to the present. Assignments from the work of Strasburger, Henneguy, Hertwig, Wilson, Guignard, Beneden and Driesch will be made and methods of cytological research indicated in the laboratory. Open to those who have completed course III or IV. Open also as a major or minor to candidates for the degree of master of science.
- VI. Algology.** Junior or senior. *I, II. Assistant Professor Tilden.*
Lectures, laboratory and reference work. Instruction is also given in the preservation of material. The work of the first semester includes a detailed comparative morphological and taxonomic study of the freshwater algae, Cyanophyceae and Chlorophyceae, (with a systematic examination of the forms found in the Minneapolis water supply) and of the second semester a similar course in the seaweeds, Phaeophyceae and Rhodophyceae. Either

- IX. Plant ecology.** Junior or senior II. *Professor MacMillan.*
Lectures, collateral reading and field observations. The course is designed to cover generally the domain of adaptational adjustments in plant embryology, anatomy, physiology and distribution. Particular attention is devoted to the problems of ecological distribution. Open to those who have completed course I or III. Open also as a minor to candidates for the degree of master of science.
- X. Wood technology.** Junior or senior I. *Assistant Professor Freeman.*
This course will include a histological study of the most important woods of commerce and the special taxonomy of the trees and shrubs of Minnesota. Field trips, lectures and laboratory. Open to those who have completed course I or III.
FOR GRADUATES.
- XI. Morphology and taxonomy.** *Professor MacMillan.*
Important literature and necessary apparatus will be provided for whatever research is entered upon under the direction of the department, and the results of the investigation will be required to be prepared for publication. The course is an elastic one and will be adapted to the special training and requirements of those pursuing it. Open as a major or minor to candidates for an advanced degree.
- XII. Problems in plant pathology and mycology.** *Assistant Professor Freeman.*
Morphological, physiological and cultural problems in the diseases of plants. Methods of infection and culture in the study of disease in plants will be given. Open as a major or minor to candidates for an advanced degree.
- XIII. Problems in algology.** *Assistant Professor Tilden.*
Research work may be done on special groups or along any of the following lines: the freshwater algae of Minnesota; the algae of the Minneapolis and St. Paul water supplies; the algae of hot springs; lime-secreting algae; arctic marine algae (material from Vancouver Island); tropical marine algae (material from the Hawaiian Islands). Special facilities for study are offered by the Minnesota Seaside Station on Vancouver Island which is open during the summer vacation. Open as a major or minor to candidates for an advanced degree.
- XIV. Problems in cytology and embryology.** *Dr. Lyon.*
Special problems in cell morphology, life histories, embryology and histogenesis. The student will be provided with the necessary reagents, apparatus and plant-house facilities. Those so desiring may also select a subject for research from a large number of important problems, material on which has already been carefully selected and preserved for cytological and embryological study. Open as a major to candidates for an advanced degree.
- XV. Paleobotany.** *Dr. Sarsdson.*
Lectures and laboratory work with collateral reading designed to cover the historical literature. Schenck's Handbuch will be used as a guide in the laboratory. Open as a partial minor to candidates for the degree of master of arts or of science.

CHEMISTRY.

FOR UNDERGRADUATES AND GRADUATES.

- IV. Quantitative analysis.** *Professor Sidener.*
Lectures and laboratory work. The course includes an introduction to quantitative and a beginning of gravimetric analysis.
- V. Volumetric analysis.** *Professor Sidener.*
Lectures and laboratory work. The course includes an introduction to volumetric analysis with a discussion of standard solutions and the necessary stoichiometric calculations.
- VI. Organic chemistry.** *Professor Frankforter.*
Lectures and laboratory work. This course includes the aliphatic series with a preparation of the more important compounds supplemented by Levy's Anleitung zur Darstellung Organischer Präparate.

- VII. *Organic chemistry.* *Professor Frankforter.*
Lectures and laboratory work. This course includes the aromatic series with a preparation of some of the more important compounds supplemented by Fischer's Organischer Preparat.
- VII. *Theoretical chemistry.* *Assistant Professor Harding.*
Lectures and readings. The course includes a study of Lothar Meyer's *Modernen Theorien der Chemie*, Oswald's *Grundriss der Allgemeinen Chemie* and Remsen's *Theoretical Chemistry*.
- IX. *History of chemistry.* *Professor Frankforter.*
Lectures and reading. This course includes a full historical discussion of alchemy and chemistry.
- X. *Water analysis.* *Professor Frankforter.*
Lectures and laboratory work. The course includes an exhaustive discussion of the chemical and sanitary properties of water.
- XI. *Gas analysis.* *Assistant Professor Harding.*
Lectures and laboratory work. The work includes an exhaustive chemical examination of the common gases, with a determination of light and heat efficiency of combustible gases.
- XII. *The chemistry of carbohydrates.* *Assistant Professor Nicholson.*
Lectures and laboratory work. The course includes a discussion of the carbohydrate group with the important methods of analysis.
- XIII. *Industrial chemistry.* *Professor Sidener.*
Laboratory work and reading. The course includes the analysis of various commercial products.
- XIV. *Wine and beer analysis.* *Assistant Professor Harding.*
Lectures and laboratory work. The course includes the determination of alcohol and other constituents in wine and beer, with a special study of fermentation.
- XV. *Special problems.* *Professor Sidener.*
Laboratory work. The course includes the working out of various mineralogical, technological and metallurgical problems.
- XVI. *Photographic chemistry.* *Professor Frankforter.*
Lectures and laboratory work. The course includes a study of the compounds affected by the chemical rays of light, and a discussion of developers and fixers, photo-engraving, photo-reliefs and color photography.
- XVII. *Electro-chemistry.* *Professor Frankforter.*
Lectures and laboratory work. The course includes the qualitative and quantitative separations of the metals by electrolysis.
- XVIII. *Micro-chemical analysis.* *Assistant Professor Harding.*
Lectures and laboratory work. The course includes the methods for the determination of minute quantities of substance by means of the microscope.
- XIX. *Food adulterations.* *Assistant Professor Harding.*
An examination of common food products for adulterants.
- XX. *Iron and steel analysis.* *Professor Sidener.*
Lectures and laboratory work. The course includes the rapid determination of iron by the various methods, as well as the determination of the associated elements, sulphur, phosphorus, silicon, manganese and carbon.
- XXI. *Mineral analysis.* *Professor Sidener.*
The course includes the analysis of building stones and some of the most important minerals.
- XXII. *Inorganic preparations.* *Assistant Professor Harding.*
The preparation of inorganic salts, supplemented by Bender's *Anorganische Preparaatkunde*.
- XXIII. *Colloquium.* *Professor Sidener.*
A thorough quiz in general inorganic chemistry.
- XXIV. *Colloquium.* *Professor Frankforter.*
A thorough quiz in general organic chemistry.
- XXV. *Special problems.* *Professor Sidener.*
This course includes work on ores of base metals, limestones, slags, etc.

XXVI. *Physical chemistry.*

Professor Frankforter.

Lectures and laboratory work. The laboratory work will include that laid down by Jones and Walker with such references as Nernst and Ostwald.

This work must be taken in regular class. For details, see program of the School of Chemistry.

FOR GRADUATES.

Courses offered by Professor Frankforter.

For the major work in chemistry leading to the higher degree, no specific courses are offered. On the contrary, the candidate will be given some chemical problem which will require original investigation to solve. The laboratories are specially prepared to offer topics for investigation along the following lines:

1. *General Inorganic Chemistry.*
2. *Analytical Chemistry.*
3. *Technological Chemistry.*
4. *Electro-chemistry.*
5. *Organic Chemistry with the following special topics:*
(a) The Alkaloids. (b) The Terpens. (c) The Resins.
6. *Physical Chemistry.*

COMPARATIVE PHILOLOGY.

This department, besides offering courses in (1) the general principles of linguistic science, affords an opportunity for elementary studies in (2) comparative Indo-European philology, and more particularly the investigation of (3) old Germanic dialects. Related courses in (4) English philology will be found under 'English Language and Literature.'

Courses offered by Professor Klacber.

FOR UNDERGRADUATES AND GRADUATES.

- I. *General Introduction to the Science of Language.* (The life and growth of language.)
- II. *Studies in Semasiology.*
- III. *Introduction to Germanic Philology.*
- IV. *Comparative Phonology of English and German.*

FOR GRADUATES.

- I. *Comparative Grammar of the Greek, Latin, and Germanic Languages;* with a general survey of the field of Indo-European Philology.
- II. *Urgermanische Grammatik.*
- III. *Gothic:* Grammar and Reading of the Gospels. The relation of Gothic to the other Teutonic dialects will be especially emphasized.
- IV. *Old Saxon:* Grammar and Interpretation of the Heliand.
- V. *Old High German.*

Courses II, III and IV, V, will be given in alternate years.

ECONOMICS, PUBLIC FINANCE AND INTERNATIONAL LAW.

FOR UNDERGRADUATES AND GRADUATES.

The particular lines and subjects of study are selected by individuals or groups after consultation with the professors of the department.

When insufficiently grounded in elementary subjects, graduates are permitted to join undergraduate sections, but are expected to do more work than is required of undergraduates.

- III. *Money and Banking.* II. Professor McVey.
A course in the principles of money and banking, dealing with fundamental principles illustrated by existing monetary systems and legislation. Text books, lectures, papers and discussions.
- IV. *Modern Industrial Legislation.* II. Professor McVey.
A course based upon McVey's Modern Industrialism. This course deals with the problems and legislation arising from industrial conditions such as labor questions, trusts, monopolies, etc. Assigned topics, lectures, and collateral reading.

- V. Corporation Finance.** I. Professor McVey.
A study of the methods of financing modern corporations, their position in the law and the analysis of their accounts and statements. Text-books, Green, Corporation, Finance; Ripley, Trusts, Pools and Corporations; Wyman's Cases; Robinson's Investment Securities; Woodlock, Anatomy of a Railroad Report; Lectures, collateral reading and problems.
- VI. Public Finance Part I.** I. Professor Folwell.
Public expenditures national, state and local, from the standpoint of public wants; budget framing; treasury administration and accounting; public debts in peace and war. Illustrations chiefly from American practice. Lectures and exercises.
- VII. Public Finance Part II.** II. Professor Folwell.
The public revenue, national, state and local—from taxation and other sources. In particular, the principles and practice of taxation in the United States.
- VIII. Advanced Economics.** I. Professor McVey.
In this course further consideration is given to selected topics from the course in elementary economics. Carver Distribution of Wealth is used as a text, supplemented by readings and problems. Lectures, papers and discussions.
- IX. Transportation.** II. Professor Folwell.
The evolution of transportation in the United States, and of railroads in particular. Economic aspects, public policy and finance of railroading. Open to senior engineers.
- X. Monetary History of the United States.** [1] I, II. Professor McVey.
In this course the problems arising from the changes and alterations in the money of the United States from 1770-1900 are discussed. The work consists of lectures and assigned topics based upon Hepburn's Contest for Sound Money and Noyes' Thirty Years of American Finance. Students registering for this course are required to have the element of economics, course I, and money and banking course V. The section meets one hour each week throughout the year. The hour of meeting will be determined by the convenience of students and instructor.
- XII. Methods of Investigation.** [1] II. Professor McVey.
A course in methods of using libraries, collecting and organizing material, followed by the actual investigation of important questions.
- *XIV. Economic Schools and Movements.** d. h. I, II. Professor Folwell.
- *XV. Statistics and Economics.** d. h. I, II. Professor Folwell.
*These courses are given in alternate years.
- XVI. International Law.** I. Professor Folwell.
An elementary treatment by lectures with required exercises; illustrations chiefly from American history.
- XVII. Political Schools and Movements.** d. h. I, II. Professor Folwell
This course is given in a seminar for graduates and seniors especially interested and qualified. It alternates with courses XIV and XV above.

EDUCATION.

FOR GRADUATES.

Preliminary Requirements: Students who desire to undertake graduate work in education must have a general knowledge of psychology and of the history of education, and some acquaintance with the theory of education. For a minor in education the candidate may pursue studies either in the theory and practice of elementary teaching, the organization and methods of secondary education, or in advanced educational theory and administration. Students who undertake a major in education are expected to do work in at least two of these fields. Selection will be made by the candidate on the approval of the head of the department from the following courses:

- IV. Secondary Education.** I. Professor James.
- V. Practice of Elementary Teaching.** I. Professor Rankin.
- VI. Practice of Secondary Teaching.** II. Professor Rankin.

- IX. *School Supervision.*
- X. *Comparative Study of School Systems.*
- XI. *Modern Educational Theories.*
- XII. *Problems in Elementary Education.*
- XIII. *Problems in Secondary Education*

- II. *Professor Rankin.*
- 1. *Professor James.*
- 11. *Professor James.*
- 1. *Professor Rankin.*
- 11. *Professor James.*

ELECTRICAL ENGINEERING.

The courses offered by the department of electrical engineering are open to graduate students having the required preliminary training. Thorough courses in physics and mathematics are essential prerequisites. The laboratory, shop and library of the department provide facilities for a moderate amount of research work in addition to the regular courses of study.

The laboratory equipment includes about forty dynamo electric machines of various types and sizes for direct and alternating currents, such as constant current and constant potential direct current generators and motors, single phase and polyphase alternators, commutating, induction and synchronous motors and rotary converters, each furnished with suitable regulating devices. A number of these machines have been equipped with special devices for experimental purposes. Lamps, rheostats, batteries, fans and brakes afford convenient and ample means for taking up the energy of dynamos and motors. To facilitate testing, there are a number of pairs of similar machines. A three-ton traveling crane facilitates handling the machines. Power is obtainable from a main shaft driven by the engines of the lighting plant, or by motors connected with the University power circuits, with a storage battery or with the circuits of The Minneapolis General Electric Company, which supplies direct current at 500 volts and alternating current at 2,250 volts. The laboratory has equipment for obtaining low voltage direct or alternating current up to 2,000 amperes, for continuous EMF up to 2,000 volts and for alternating EMF up to 40,000 volts. An excellent assortment of instruments of well-known American and foreign makers is available for laboratory use. A well equipped standardizing laboratory furnished with certified standards of current, electromotive force and resistance, allows the frequent checking of instruments, so that students may work to any desired degree of refinement. The meter and lamp testing laboratories are furnished with a wide variety of arc and incandescent lamps and meters with all necessary standards and other accessories. The electro-chemical laboratory provides facilities for the construction and testing of various cells, for electro-plating and other electrolytic processes and for the formation and study of electric furnace products. Alternators, rotary converters, transformers, lamps, motors, condensers, special apparatus and suitable instruments afford facilities for the experimental study of alternating currents. Telephone transmitters, receivers and accessories provide for practice in assembling and testing the ordinary telephonic apparatus and circuits and for investigation.

The department library contains an excellent collection of electrical and allied works, including a full set of United States Patent Office Gazettes. New books and trade publications are being added continually. Files of twenty-two journals are nearly complete and others are being collected and bound. These, with the files in the general and other departmental libraries of the University, offer excellent facilities for research work. The reading room receives regularly the leading American and foreign periodicals devoted to electrical engineering and allied interests.

FOR UNDERGRADUATES AND GRADUATES.

- I. *Applied electricity.* [2] Junior I. 36 hours. *Professor Shepardson.*
Outline of industrial uses of electricity; units; application of Ohm's law; methods and calculation of wiring; electrical instruments and measurements. Text book: Shepardson, *Electrical Catechism*. Preparation required: physics, course I.
- II. *Dynamos and motors.* [2] Junior II. 72 hours. *Assistant Prof. Springer.*
Theory of electro-magnet and direct current dynamo and motor; methods of regulation, construction and operation of dynamos and motors; methods of testing. Preparation required: electrical engineering, course I; physics, courses I and II (a); differential and integral calculus.
- III. *Alternating currents.* [3]. Senior I, II. 108 hours. *Professors Eddy and Shepardson.*
Phenomena, measurement and use of alternating currents; theory of line, transformer, generator and motor; types of apparatus. Text-book: Steinmetz, *Alternating Current Phenomena*. Preparation required: electrical engineering, courses I and II.

- IV. *Electrical engineering practice. Electric railway.* [2] Senior I. 18 hours. One-half semester. *Assistant Professor Springer.*
History and development; different systems of distribution, location and calculation of feeders; line and track construction; choice of motors, trucks, generators and engines; operation and repairs. Text-book: Gotshall, *Electric Railway Economics*. Preparation required: electrical engineering, course II.
- V. *Electrical engineering practice. Batteries.* [2] Senior I. 18 hours. One-half semester. *Assistant Professor Springer.*
General theory of primary and secondary cells; types and methods of construction; commercial applications; operation of battery plants; construction and test of cells by students; test of a commercial plant. Text-book: Lyndon, *Storage Battery Engineering*. Preparation required: electrical engineering, course II.
- VI. *Electrical engineering practice. Electric lighting.* [2] Senior I. 18 hours. One-half semester. *Professor Shepardson.*
Comparison of different sources of light; photometry, physics of the arc; history, design and regulation of arc lamps; adaptation to constant currents, constant potential and A. C. circuits; carbons; history, manufacture and economy of incandescent lamps; distribution of light. Text-book: Bell, *Art of Illumination*. Preparation required: electrical engineering, course II.
- VII. *Electrical engineering practice. Electrical transmission.* [2] Senior II. 18 hours. One-half semester. *Professor Shepardson.*
Utilization of natural forces; various methods of transmission; theory of electric motor; power distribution with constant current, constant potential and alternating systems; design of line; study of particular plants. Preparation required: electrical engineering, courses I, II and VI.
- VIII. *Electrical engineering practice. Central stations.* [2] Senior II. 18 or 36 hours. One-half or one semester. *Professor Shepardson.*
Preliminary surveys; choice of electrical systems; load diagrams; best units of power; comparison of steam, gas and water power; location, design and erection of station buildings; boilers, engines, dynamos, storage batteries, switch board and lines; operation and regulation; maintenance of plant; emergencies; examination of stations in Minneapolis and St. Paul. Preparation required: electrical engineering, courses II. and VI.
- IX. *Electrical engineering practice, telegraph and telephone.* [2] Senior II. 18 or 36 hours. One-half or one semester. *Professor Shepardson.*
Various systems and instruments used in local and long distance telegraphy and telephony, design and construction of switch-boards and lines; protection from inductive and other disturbances; police, fire alarm and district messenger systems. Preparation required: electrical engineering, courses I and VI.
- X. *Electrochemistry.* [2₂] Senior II. 36 or 72 hours. *Professor Shepardson.*
Theoretical and experimental study of electrolysis, electrodeposition and electric furnaces.
- XI. *Electrical design.* [2₂] Junior II. 72 hours. *Assistant Professor Springer.*
Problems in designing circuits, electro-magnets and dynamos; complete working drawings and specifications to accompany each design. Text-book: Wiener, *Dynamo Electric Machines*. Preparation required: physics, courses I and II; electrical engineering, courses I and II; machine design, course XI.
- XII. *Electrical design.* [2₂] Senior I. 72 hours. *Professor Shepardson.*
Design of a dynamo or other problem as assigned. Preparation required: electrical engineering, courses II and IV.
- XIII. *Electrical design.* [3₂] Senior II. 108 hours. *Professor Shepardson.*
Designs, specifications and estimates for an electric light or power plant, or other approved problem. Preparation required: electrical engineering, courses IV and VI.
- XIV. *Electrical laboratory.* [3₂] Junior II. 108 hours. *Assistant Professor Springer.*
Tracing circuits and locating faults; measurements of conductivity and insulation; calibration and use of instruments; operation and characteristic curves of dynamos and motors. Preparation required: physics, courses I and II, electrical engineering, courses I and II.

- XV. Electrical laboratory.** [2_o or 4_o] First semester [3_o] Second semester.
Senior I. 72 or 144 hours; II. 108 hours. *Professor Shepardson.*
Photometric and electrical tests of incandescent and arc lamps and regulating devices. Experimental study of alternating currents; regulation and efficiency tests of alternators, transformers, rotaries and motors.
- XVI. Electrical laboratory.** [1_o or 2_o] Senior I or II. 36, 72 hours.
Professors Shepardson and Springer.
Efficiency tests and special problems.
- XVII. Electrical measurements of precision.** [2_o] Senior I, or II. 72 hours.
Assistant Professor Springer.
Lectures and laboratory work. Measurements of resistance, voltage, current, self-induction and capacity; standardization of measuring instruments. Open to a limited number.
- XVIII. Plant operation.** Senior I, II. *Professor Shepardson and Mr. Dixon.*
Practice in operation and care of boiler, engines, motors, dynamos and circuits of the University lighting plant. Nine runs of four hours each.
- XIX. Journal reading.** [1_o] Senior I. 36 hours; II. 36 hours
Professor Shepardson
- XX. Electric power.** Senior I. 54 or 72 hours. *Assistant Professor Springer.*
For Civil, Mechanical and Mining Engineers.
Elements of theory and practice of electrical measurements, wiring, dynamos, motors and electric lighting. Thirty-six lectures and recitations and forty-eight hours laboratory. Text-book: Shepardson, Electrical Catechism. Preparation required: physics, course I.
- XXI. Dental electricity.** [2] Senior I. Dentists. 27 hours.
Assistant Professor Springer.
Electrical and magnetic units; electrical instruments and measurements; electro-dental apparatus. Recitations and experimental lectures. Text-books: Shepardson, Electrical Catechism, and Custer, Dental Electricity. For seniors in dentistry.
- XXII. Electrical measurements of precision.** *Assistant Professor Springer.*
Lectures and laboratory work. Precise measurements of resistance voltage, current, self-induction and capacity; standardization of measuring instruments.
- XXIII. Illumination engineering.** *Professor Shepardson.*
Lectures and laboratory work. Investigation of performance of electric and gas lamps, reflectors and diffusers; luminous efficiency, distribution, color characteristics, physiological phenomena methods of determining location, kind and quantity of lights for obtaining desired illumination.
- XXIV. Telephone engineering.** *Professors Shepardson, and Eddy.*
Lectures and laboratory work. Theoretical and experimental study of telephonic apparatus: lines and line phenomena, including induction, transpositions, loading coils, etc.
- XXV. Alternating current phenomena.** *Professor Shepardson.*
Lectures and laboratory work. Study of wave-forms, transient phenomena; oscillographic investigations; tests of apparatus.

ENGINEERING AND MECHANICS.

FOR UNDERGRADUATES AND GRADUATES.

- I. Applied mechanics.** [90] Junior I. *Professor Eddy.*
Statics and dynamics including the laws of equilibrium, motion, work and energy as applied to rigid bodies, and a study of the strength and elastic properties of materials of construction required in the design of beams, posts, masonry arches and the equilibrium polygon. Open to students who have completed the work of the first two years in mathematics and physics.
- II. Hydraulics and pumping machinery.** [90] Junior II. *Professor Eddy.*
The laws of the equilibrium pressure and flow of liquids and gases; the theory of the action of pumps and air compressors. Open to those who have completed course I in applied mechanics.

III. *Thermodynamics of steam and other engines.* [54] Senior I.

Professor Eddy.

The mechanical theory of heat as applied to steam, gas and oil engines, by analytical and graphical methods. Open to those who have completed courses I and II, in applied mechanics and hydraulics.

IV. *Water turbines.* [36]

Senior I. Professor Eddy.

The general mathematical theory of hydraulic turbines, especially with reference to the design of the various types of reaction turbines as affecting their efficiency; turbine governors. Open to those who have completed course II in hydraulics.

V. *Steam turbines.* [36]

Senior II. Professor Eddy.

The thermodynamics of the various types of steam turbines, and theory of their design and construction. Open only to those who have completed courses II and IV on the steam engine, etc., and water turbines.

VI. *Refrigerating machinery.* [18]

Senior II. Professor Eddy.

The thermodynamics of ammonia machines of the compression and absorption types, etc. Open to those who have completed course III in the steam engine.

FOR GRADUATES.

Professor Eddy.

Selections from the following list of courses in theoretical mechanics and mathematical physics will be offered each year to graduates (or possibly to undergraduates) of sufficient preparation in mathematics and physics according to the needs of the students' applying and the amount of time at the disposal of the professor, with whom arrangements should be made at as early a date as possible.

VIII. *Theory of elasticity.*IX. *Hydrodynamics and fluid motion.*X. *Kinetic theory of gases.*XI. *Potential function and electrical theory.*XII. *Fourier's Series, spherical harmonics, etc.*XIII. *Electro-magnetic theory of light.*XIV. *Theory of function of the complex variable.*XV. *Directional calculus and vector analysis.*

ENGLISH LANGUAGE AND LITERATURE.

FOR GRADUATES.

Courses in English Philology offered by Professor Klaeber.

I. *Old English (Anglo-Saxon):* Grammar and Reading of Selections.II. *Critical study of the Beowulf.*III. *Introduction to the Middle English Language and Literature.*

Related courses will be found under "Comparative Philology."

FRENCH.

(Italian and Spanish.)

FOR UNDERGRADUATES AND GRADUATES.

V. *Lectures and conversations concerning the writers of the classical period and readings of works produced during this period, including La Fontaine, Corneille, Racine, Moliere; some modern authors will be read for the purpose of comparison.*

Mr. Frelin.

Open to those who have completed courses I and II or course III.

VI. *Advanced French Conversation.*

Professor Benton and Mr. Frelin.

VII. *Lectures, in French, on the literature of the nineteenth century.* I, II

Professor Benton.

The works of many of the writers of this century will be read and reports given in class, including Chateaubriand, Victor Hugo, Balzac, Renan, Taine, Bourget, Francois. Advanced French Composition.

- X. *Spanish, advanced.* I, II. Mr. Melom.
Advanced grammar, Cervantes, Calderon, Lope de Vega.

FOR GRADUATES.

- XI. *Romance philology. Old French.* Professor Benton.
French and other Romantic languages from popular Latin. Reading old *sis des Auteurs Français du Moyen Age*, par L. Cledat. Some of the oldest monuments of the French language interpreted and translated into modern French, such as *Serments de Strasbourg*; *La Vie de Saint Alexis*; *La Cantilene d'Eulalie*; the chronicles of Villehardouin, *La Chanson de Roland*, Froissart. Phonetic changes studied and their laws examined. Special attention is given to those forms which have entered into the English language. This course is especially valuable to students in English philology.
- XII. *History of the drama.* Professor Benton.
- XIII. *Italian. Dante's Divine Comedy.* Professor Benton.
- XIV. *Old Spanish.* Professor Benton.
Development of Castilian dialect. *El Poema del Cid*.

GEOLOGY.

FOR UNDERGRADUATES AND GRADUATES.

- III. *Industrial geography.* Junior or senior II. Professor Hall and Mr. Ball.
(a) The relations of the natural development of North America to its physical structure.
(b) The geography of Minnesota in its relations to the industrial resources and development of the state.
Open to those who have taken course I or II.
- IV. *Geology of Minnesota.* Junior or senior II. Professor Hall.
(a) An historical survey of the facts and principles of pre-Cambrian geology as exemplified in the geological features of the Lake Superior region and of Northern and Eastern Minnesota.
(b) A discussion of the geology and mineral resources of the state, particularly with reference to its deposits of clay, building stones and ores.
Open to all who have taken course I.
- VII. *Paleontology.* Senior I, II. Assistant Professor Sardeson.
The chief types of organisms as represented by fossils will be studied successively. The leading fossils and their phylogenetic history will be treated with considerable detail. Lectures and demonstrations. Open to students of geology and biology.
- VIII. *Paleontologic practice.* Senior I, II. Assistant Professor Sardeson.
The course may be taken by advanced students in geology and biology in conjunction with course VII. Exercise in the preparation and study of materials; examination of collections, and reading will be carried on with a view to more complete knowledge of the groups of fossil organisms as presented in course VII. Laboratory, and field work.
- X. *Petrography.* Junior or senior II. Mr. Parsons.
An investigation of the megascopic and microscopic characters of crystalline rocks; a discussion of their habit, mineral composition and genetic relations. The course discusses the historical succession and broader stratigraphic relations of rocks; it also extends into an examination of some Minnesota groups of crystallines. Practically a continuation of course IX. Laboratory, with lectures and reference reading.
- XII. *Ore deposits.* Junior or senior I. Professor Hall.
History of mineral discovery and development in the Americas; a discussion of the origin and distribution of ore deposits, embracing the chemical processes involved in their formation and subsequent alterations; a description of the geology and mineralogy of ore bodies, particularly those yielding gold, silver, copper, iron, lead and zinc.
- XIV. *Special problems.* Senior II. Professor Hall
The investigation by individual students of particular problems, involving the field work of an investigation of some particular for-

mation and with the laboratory investigation and reading incident to the study of the material collected. The methods of systematically recording and interpreting geological and mineralogical data as observed in the field, the keeping of note-books and the preparation of geological maps, profiles and sections will be taught.

FOR GRADUATES.

- XVI. Petrographical problems.** *Professor Hall and Mr. Parsons.*
A study of rocks as geological bodies; the genesis of rocks and their chemical and dynamical alterations, illustrated in the gneisses and gabbro schists of the Minnesota river valley or the granites and basic eruptives of central Minnesota.
- XVII. The Keweenawan eruptives, [1]** *Professor Hall and Mr. Parsons.*
Of eastern and northeastern Minnesota, their stratigraphic relations, textural and structural characters; or other problem to be selected on consultation.
- XVIII. Glacial geology.** *I. Professor Hall.*
The local features of glacial phenomena. Field work will form the special feature of this course, embracing the formations at Minneapolis or some area accessible from it, as a survey of the glacial lakes in the vicinity, the gorge of the Falls of St. Anthony, the Dalles of the Saint Croix and other problems. The special field to be selected on consultation.
- XIX. Palaeontologic geology.** *Assistant Professor Sardeson.*
A study of the Ordovician fauna with special illustrations from the Ordovician of Minnesota and neighboring states.
- XX. Paleontology.** *Assistant Professor Sardeson.*
The study of a selected group of fossils; a practical acquaintance with the forms and literature of the group is sought. The course is to be supplemented by a thesis.

MINERALOGY.

FOR UNDERGRADUATES AND GRADUATES.

- IV. Optical mineralogy.** *Junior or senior I. Mr. Parsons.*
A study of the microscopic structure of crystals and crystal grains. An application of methods used in determining minerals by their optical properties; goniometric and staurosopic practice, embracing the elements of lithology. Lectures and laboratory work.
- V. The morphology of minerals.** *Junior or senior II. Mr. Parsons.*
A study of crystallography, embracing projection and the geometric relations of crystal planes. The identification of minerals from crystal measurement and mathematical calculation. Crystal nomenclature.
- VI. Physico-chemical methods with their applications.** *Senior I. Mr. Parsons.*
The method of micro-chemical analysis described and demonstrated; the leading elements found in minerals are determined through the aid of crystalline precipitates of known compounds. Special attention is given to the study and determination of the rock-making minerals.
- VII. An outline of mineralogy. [1]** *Junior or senior. Mr. Parsons.*
A study of methods of identification of minerals, with their applications. Conferences, reading and demonstrations. Throughout the year.

FOR GRADUATES.

- VIII.** *Professor Hall and Mr. Parsons.*
Original problems in morphological and physical mineralogy. Investigations in mathematical crystallography and its application to crystal development and structure. Further applications than are made in course IV of the optical characters of minerals in identification of mineral species.
- IX.** *Mr. Parsons.*
Special investigations in physical and chemical mineralogy. Special attention is here given to tenacity and electrical properties and their relation to crystal form, cleavage and fracture. Dimorphous compounds are investigated and the conditions governing their formation studied. The physical properties of artificial mineral compounds are compared with those of natural minerals.

- X. *Professor Hall and Mr. Parsons.*
Description of mineral occurrence and association. Genetic relationships. Field work in connection with the different phases of the particular problem in hand.
The equipment of the Department of Geology and Mineralogy is sufficient for many lines of graduate work. The department has collected from many localities, both within and without the state, and the Geological Survey made extensive collections during the years of its active field work. The material thus gathered, the published literature on the state and the field within easy access from the University afford suggestions of unsolved problems in a number of different geological lines.

GERMAN.

FOR UNDERGRADUATES AND GRADUATES.

- X. *Modern authors. German literature of the Nineteenth century.* Pre-requisite, course IX. I, II. *Professor Moore.*
First semester.—Romantic school and Junge Deutschland.
Second semester.—German literature since 1848.
- XI. *History of German literature.* Prerequisite course IX. I and II. *Mr. Juergensen.*
Lectures in German. Reviews and topical research on the part of the students.
- XII. *Seminar in German drama.* [1] I, II. *Professor Schlenker.*
This course aims to give in outline the history of German dramatic literature from its beginnings to, and including, the classic drama. Open to graduates; also, by permission of the instructor, to undergraduates, but without credit.
- XIII. *History and literature of the Reformation.* Prerequisite, course X. I, II. *Professor Moore.*
Readings from Brandt, Luther, Hutten, Sachs, Murner and Fischart. Selections from the histories of Jansen and Egelhaaf.
- XIV. *Middle High German.* I, II. *Professor Schlenker.*
Study of the language and literature of the period. Paul's Mhd. Grammatik. Selected readings from Der Arme Heinrich, Niebelungen Lied, Gudrun, Walter Von der Vogelweide, etc.

FOR GRADUATES.

- XV. *The German Volkslied.* *Mr. Williams.*
Outline of the history and development of the Volkslied. Study of selected numbers in Uhlands Volkslieder with references to other general and special collections. Influence of the folk-song upon lyric and ballad writers.
- XVI. *Lessing and the Age of Enlightenment.* *Professor Moore.*
Reading of Lessing's critical and controversial writings.

GREEK.

FOR GRADUATES.

- XVIII. *Advanced Course in Poetry.*
Epic and Lyric Poetry *Professor Hutchinson*
Dramatic Poetry *Professor Brooks*
- XIX. *Advanced course in Oratory* *Assistant Professor Savage.*
- XX. *Later Greek (322 B. C.—200 A. D.)* *Professor Hutchinson.*
- XXI. *Advanced course in Modern Greek.* *Professor Brooks.*
Inasmuch as the exact nature of the work will differ with the desires and purposes of the applicants who must be dealt with individually, it has not been thought best to attempt a more specific statement than the above. No undergraduate courses in Greek will be accepted as part of the work leading to an advanced degree.

HISTORY.

FACILITIES.

The Department of History is equipped with library material for "practice courses" in research in American History, especially the colonial and revolutionary periods, in English and French medieval history, in the French Revolution, and in certain phases of European Nineteenth Century history. Valuable additions to the University resources in some of these lines are to be found in the excellent Library of the State Historical Society, and in the State Library at the Capitol in St. Paul (thirty minutes distant), and in the City and Athenaeum libraries in Minneapolis.

In none even of the lines mentioned, however, is the Department satisfactorily prepared to give more than two years of graduate work, with due regard for economy of the student's time and energy. Therefore, if a student desires to take his doctorate in history here, he must be prepared, until the library facilities are materially improved, to do at least a third of his work in libraries elsewhere, under direction of the Department.

COURSES OF INSTRUCTION.

The following are "general courses" (lectures and reading, with study of selected documents and some research work). They are open to upper classmen in the undergraduate college who have completed one or two elementary courses there; and they may be taken as minors, or parts of minors, for the master's degree. Any one of them may be taken, also, for part of a major towards the master's degree, provided, (1) that the applicant has made large general preparation in other fields of history, and, (2) that the course chosen be accompanied by sufficient work in more intensive courses in the same field. (Thus if an applicant is well prepared in European history, including English constitutional history, but has had little American history, he might be allowed a major in v followed by two, three, or four courses selected from VII-XIV.)

III. *The Renaissance and Reformation.*

I. Assistant Professor White.

Open to those who have completed either I or II, and a desirable preparation for IV.

The Renaissance and Reformation will be studied as general European movements, with the emphasis upon the work of individual men and upon ideas rather than upon politics and institutions. The purpose of the course will be to show how the medieval world became the modern world.

IV. *Europe since 1789.*

I, II. Professor Anderson.

Open to those who have completed course I or II. The entire class meets twice each week for lectures or recitations. The third exercise is devoted to the study of important historical documents, drawn principally from Anderson's *Constitutions* and other *Select Documents Illustrative of the History of France, 1789-1901*. This work is done in small groups which meet in the European history seminar room.

The history of France occupies the most prominent place in the course, that of other countries being grouped about it, as far as possible. Much attention is given to international affairs, the principal territorial changes being illustrated with a series of wall maps prepared for the course under the direction of the instructor. A special effort is made to put the students into a position to understand the present governments and politics of the leading European states.

V. *Constitutional history of the United States to 1840.* I, II. Professor West.

Open to those who have completed course II; and required for courses VI—IX, and for XI, XIII, and XIV. The aim is to make this a "practice course;" the work is done partly by co-operative topical reports, and students are expected to consult primary sources to a greater degree than is possible in most undergraduate courses. During part of the year the class will meet once a week in small sections for the study of documents.

VI. *American History, 1841-1885.*

II. Professor Anderson.

Open to those who have completed, or are pursuing, course V. Special attention is given to the development of the slavery issue in politics, the political history of the Civil War and reconstruction.

XV. *Historical method and bibliography.* [2] II. Assistant Professor White.

Open to those who have completed course I or course II. The course is designed especially for those intending to do advanced work in history. It aims to make clear to the students the genesis of the modern historical method and to introduce him in a practical way to the use of the best tools in historical study. The work divides naturally as follows:

1. Exercises in historical criticism and interpretation. One or more important historical sources will be studied intensively by the class.
2. History of historical writing; especially the work of Von Ranke and his followers and the origin of the seminar system. Some account will be taken of present methods and advantages of study in Germany and France.
3. Bibliography. Purpose, to gain a working knowledge of existing helps to historical study, such as standard bibliographers, historical magazines, source material, etc.

While the knowledge of Latin or the modern languages is an advantage, it is not a necessity in this course.

XX. *English history, 1660-1905.* I. Professor Anderson.

Open to those who have completed course II. The period from 1660 to 1815 is covered in a rapid survey. From 1815 the work is more intensive, the topics and readings affording an opportunity to become acquainted with the principal British reviews and with two or three of the leading newspapers.

XXI. *Greek history.* I. Assistant Professor Westermann.
 Especial attention will be given to the period following Alexander's conquests.

The following courses are "intensive" or "advanced" courses. Each one of them requires the completion of the corresponding "general" course in the list above. They may be taken, in proper combinations, for majors for the master's degree, or, by ones or twos, for minors.

VII. *The making of the constitution of the United States.* I, II. Professor West.

Open to those who have taken course V with distinction, and to graduates. Each member of the class studies in detail the transition in one of the original colonies to commonwealth government, with the constitution of his chosen state. The work of the Philadelphia convention is then taken up and the accounts of later writers are compared with the sources. "We the people," the "compact" theory, and the province of the supreme court as "final arbiter," are topics especially investigated, with such further aids as the writings of the day and the discussions of the ratifying state conventions afford. Besides the class work each student will present a written report upon the history of some important bill providing for the admission of a state, and some constitutional question in connection with congressional legislation.

VIII. *American history since 1789 as shown in the development of constitutional law.* Professor West.

In alternate years, not offered in 1906-07. Open to seniors who have completed course V, to graduates, and to qualified law students. Course VII is a desirable preparation. This course is not designed to be a systematic treatment of either history or constitutional law. It consists of a careful analysis of cases selected from Thayer's Cases on Constitutional Law, studied in their historical setting and with reference to the course of development.

IX. *Studies in American biography.* I. Professor Anderson.

Open to seniors who have completed course V and to graduates. In this course the work will each year center about the political activity of a single important character. In the choice of a subject two points will be especially borne in mind.

1. To select a character not only important *per se* but representative of some great historical movement or idea.
2. To select one who has left an abundance of material, valuable not only for his own part, but throwing light upon the action of others.

It is the aim to give each member of the class an opportunity to work up carefully topical divisions of the field and some acquaintance with the entire body of writings relating to the subject. Not given in 1906-07. When next offered, the subject will be Thomas Jefferson.

- X. *A critical study of historical masterpieces.* II. *Professor Anderson.*
Open to undergraduates who have taken two courses in history, and to graduates.
The object of this course is to develop the habit of reading history critically. Each year a masterpiece of historical literature will be minutely and critically studied. Every student will be required to read critically the entire work studied and in addition, to analyze and report upon assigned portions of it. These reports will be made the basis of the class work, which will consist mainly of discussions carried on by the students under the direction of the instructor. Not given in 1906-07.
- XI. *The history of American diplomacy.* I. *Professor Anderson.*
Offered to seniors and graduate students who have had two courses in history or one in history and one in international law. History v is the best preparation. The course is designed to afford instruction upon the following matters: (1) The organization and methods of the diplomatic corps. (2) The history of the most important diplomatic negotiations. (3) The effect of the foreign policy upon the internal affairs of the country.
- XII. *The history of European diplomacy since 1789.* II. *Professor Anderson.*
Offered to seniors and graduate students who have had two courses in history or one in history and one in international law. History iv is the best preparation.
Ability to read easy French is required. The course centers about a critical reading of the principal treaties.
- XIII. *Colonial expansion and administration.* II. *Professor West.*
Open to those who have completed iv or v. The history of the colonial acquisitions of the great nations will be surveyed rapidly, and colonial institutions and governments will be studied and compared in detail.
- XIV. *A critical study of authorities for early New England history—based upon a reading of Winthrop's New England.* [2] I, II. *Professor West.*
Open to graduates and seniors who have completed course v. This is primarily a course in historical criticism. Each member of the seminar has a group of secondary authorities assigned him which he is to criticize in the light of the original sources. The study involves also a careful comparison of the chief sources with each other, and incidentally it leads to a minute treatment of political, social and economic development in early New England. The number admitted to the course is strictly limited to eight. Given in alternate years.
- XVIII. *The Beginnings of the English Judiciary.* II. *Assistant Professor White.*
- XIX. *Expansion of America as studied in its highways of immigration.* I, II. *Assistant Professor McDonald.*
Open to students who have completed course v and to qualified graduates. This is a study of roads and methods of pioneer travel in that westward movement of population which extended the inhabited area of the United States from the seaboard to the Mississippi valley.
Not offered in 1906-7.
- XXII. *An intensive course on some topic in Greek history,—the subject to be varied from year to year.* II. *Assistant Professor Westermann.*

LATIN.

FOR UNDERGRADUATES AND GRADUATES.

- I. *Teachers' course in Caesar.* *Professor Pike.*
A review and drill upon Books I-IV. of the Gallic war.
A review of Grammar and elementary Latin composition; a discussion of various problems connected with teaching.
- II. *Teachers' course in Virgil.* *Professor Pike.*
A review and drill upon Books I-VI of the Aeneid, a review of Prosody and practice in the quantitative method of pronouncing Latin verse.
- III. *Advanced Latin composition and lectures on Latin style.* *Professor Pike.*

- IV. *Virgil's Aeneid Books VII-XII.* *Professor Pike.*
The instructor will translate and comment. The student will not be required to prepare a translation but will be expected to read the Latin understandingly after the instructor's explanation.
- V. *Roman Elegiac Poetry.* *Professor Clark.*
Selections from Catullus Tibullus, Propertius and Ovid will be translated with a study of the rise, development and characteristics of Roman Elegiac poetry.
- VI. *Correspondence of Cicero.* *Professor Clark.*
Reading course in the Letters of Cicero with a study of his life and of the history of his times.
- VII. *Roman Satire.* *Professor Clark.*
Juvenal, Persius, Horace and the Fragments of early Satire with a study of the rise, development and nature of Roman Satire.
Of these courses Nos. III, V, VI, and VII are open only as minors to graduate students. Nos. I, II, and IV are open as minors only on permission of professor in charge.
- FOR GRADUATES.
- VIII. *Lucretius.* *Professor Clark.*
Translation and interpretation of the VI Books "de rerum natura" with a study of his philosophy in its relation to his sources and to other Roman writers.
- IX. *Outlines of Roman law.* *Professor Clark.*
Reading of "Robinson's Selections of Roman Law" and of the first book of "The Institutes of Justinian" with lectures and topical study of Roman private law.
- X. *Graduate seminar.* *Professor Pike.*
Interpretation of the Epistles of Seneca with a study of Stoic Philosophy at Rome.
- XI. *Orations of Cicero.* *Assistant Professor Granrud.*
Reading and interpretation of a few representative speeches. Special attention will be devoted to the technique and the language and grammar of the orations.

LAW.

FIRST GRADUATE COURSE.

- I. *Dean Pattee.*
The first course offered for the degree of Master of Laws is that of the *Philosophic Basis of Jurisprudence*. This course constitutes an inquiry into the nature of law in its most general signification. It considers the truths of reason, the "laws of nature" so-called, and the positive law or Jurisprudence. It considers the nature of International and Municipal law, and illustrates by means of judicial authorities how the primary truths of reason operate in the realm of human law.
- II. *Science of the State.* *Professor Folwell.*
This course considers the segregation from the comprehending science of politics, and the co-ordinate sciences of government and jurisprudence. The citizen and subject population; the territory, its extent and content, subdivisions, relation of people to the land, comparison of great and small states; theories of the state; liberty and opportunity as the ends of the state; the state as the organ of power, and guardian of rights; the essentia of constitutions.
- III. *Constitutional history and jurisprudence.* *Judge Pierce.*
This course is devoted to a critical study of the "dual system" of constitutional government of which the American Republic is the conspicuous example. The Federal constitution and the State constitutions are illustrated separately, in both their historical and their legal aspects, as distinct parts of one system, but which are designed to work harmoniously in unison, and are both necessary to the successful operation of the system. The Federal Courts are shown to have so conducted their administration of their high

duties as to have contributed to the proper development of the State side of the system, and to have made the Federal Government the firm bulwark of local self-government in the States. Those who enter this course as candidates for the degree must have already received the degree of bachelor of laws, from this or some other law college having a three years' course of study. Those who spend the entire year in the work prescribed for this course, and pass a satisfactory examination upon the subjects taken, will be entitled to the degree of master of laws. But no graduate of another law school, who has not been admitted to the Bar in Minnesota, will be matriculated in this course as a regular student for the degree of LL. M.; but any person who possesses the requisite legal learning may enter the course as a special student and pursue any or all of the studies offered.

SECOND GRADUATE COURSE.

Students who have received the degree of LL. B., from this or some other law school requiring three years' study of law for said degree, and who have also received the degree of LL. M., from this or some other school after not less than one year of graduate study, and who have taken high rank in all the studies leading to these degrees, may apply to the faculty for the degree of Doctor of Civil Law. A knowledge of French or German, as well as of Latin is required, and special proficiency in Roman history is necessary to entitle a student to candidacy for such degree.

There is no prescribed time within which students are required to do their work in this course, but they must make themselves proficient in the subjects of Roman law, political science, comparative constitutional law, and the philosophy of jurisprudence before any thesis will be accepted from them.

None of the aforementioned degrees will be conferred until a satisfactory thesis is presented to the faculty by the student, and the thesis for the doctor's degree must be one evincing original investigation and special excellence.

Whether a class will be organized in this course during the academic year of 1906 and 1907 will depend upon the number of applicants for admission.

MATHEMATICS.

FOR UNDERGRADUATES AND GRADUATES.

- VIII. *Curve tracing.* II. *Professor Downey.*
By aid of the calculus. Open to those who have completed the first six courses.
- IX. *Differential equations.* [3 and 2] I. *Dr. Manchester.*
Open to those who have completed the first seven courses.
- X. *Solid analytical geometry.* [3 and 2] I, II. *Assistant Professor Bauer.*
The plane, the straight line in space, quadric surfaces, applications. Open to those who have had the first seven courses.
- XIII. *Method of least squares.* [2] *Professor Leavenworth.*
A study of the combination and adjustment of observations and the discussion of their precision as applied especially to engineering, physics and astronomy. Open to those who have completed the first seven courses.

FOR GRADUATES.

- XVI. *Advanced differential and integral calculus.* [2] *Professor Downey.*
This course goes farther into some of the subjects treated in courses VI. and VII. and takes up some important subjects not included in those courses.
- XVII. *Theory of curves and surfaces.* [2] *Assistant Professor Bauer.*
This is a course in Differential Geometry. The fundamental equations of the theory of curves and of surfaces will be developed. The work will be based upon Scheffer's *Theorie der Curven* and *Theorie der Flachen.*
- XVIII. *Theory of functions of a complex variable.* [2] *Dr. Manchester.*
Lectures, readings and problems. The course presupposes a knowledge of Differential and Integral Calculus and Differential Equations.

- XIX. *History of mathematics.* [2] *Professor Haynes.*
Lectures and reading, under direction, of works in the mathematical library on the ancient and modern development of mathematics.
- XX. *Projective geometry.* [3] *Assistant Professor Kirchner.*
A study of the theories and methods of Projective geometry. Perspective, homology, duality, cross-ratios, involution, reciprocals, conics, systems of conics, ruled surfaces, and special problems and exercises.
- XXI. *Perspective.* [3] *Assistant Professor Kirchner.*
The principles and practice of perspective, including shadows, reflections, distortions, corrections, systems, methods, the practical problem, and inverse constructions.

MECHANICAL ENGINEERING.

FOR UNDERGRADUATES AND GRADUATES.

- VIII. *Shop economics.* Senior II. 36 hours. (Elective.) *Professor Flather.*
Shop and factory organization and management; cost systems.
- XI. *Machine Design.* Junior I and II. 216 hours. *Professor Flather and Mr. Oliver.*
Calculation and design of such machine parts as fastenings, bearings, rotating pieces, belt and tooth gearing. Recitations, lectures and drawing-room practice. Open only to students pursuing course I in mechanics.
- XII. *Machine design.* Junior II. 72 hours. (Second half semester.)
Professor Flather and Mr. Oliver.
Application of graphical methods to the design of valve gears and link motions; Zeuner diagrams, indicator cards. Lectures and drawing-room practice. Open only to those pursuing course XVIII.
- XIII. *Machine design. Steam engine.* Senior I. 144 hours.. *Professor Flather.*
Calculations and working drawings for a high speed automatic steam engine. Theoretical diagrams and determination of details. Preparation: Courses XII and XVII.
Gas engine. An alternative course in gas engine design is offered those who have completed course XIX.
- XIV. *Machine design.* Senior II. 144 hours. *Professor Flather.*
Original designing, including machinery for changing size and form. Boiler design, cranes, pumping and transmission machinery and engineering appliances. Lectures, problems and drawing-room practice. Preparation: course XI.
- XV. *Tool design.* Senior I or II. 72 or 144 hours. *Professor Flather.*
Design of special tools for manufacturing interchangeable parts; jigs and milling fixtures. Preparation: courses V and XI.
- XVI. *Engineering design.* Senior II. 72 or 144 hours. *Professor Flather.*
Problems, designs and estimates for power plants, central stations and factory equipment. Selection of motive powers, pumps, shafting, piping and accessory plant. Preparation: courses XVII, XVIII, and XIX.

STEAM ENGINEERING.

- XVII. *Steam boilers.* Junior I. 18 hours. *Professor Flather.*
Application of theory and practice in the design and construction of steam boilers, chimneys, boiler settings and accessories, smoke prevention, mechanical stokers; methods of operating boilers with safety and economy. Open only to students pursuing course I in mechanics.
- XVIII. *Steam engine.* Junior II. 54 hours. *Professor Flather.*
Mechanics of the steam engine. Work in the cylinder; effect of reciprocating parts; steam distribution. Mechanism of the steam engine. A study of the details of modern steam engines. Valves and valve gears. A study of the slide valve, link motions and other reversing gear; automatic cut-off gears and the Zeuner diagram. The steam engine indicator. Principles and operation of the instrument, indicator rigging; indicator cards; compounding. Preparation, course I. in applied mechanics.

- XIX. Gas engines and producers.** Junior II. 36 hours. *Mr. Oliver.*
Principles of operation of two cycle and four cycle engines; cylinder construction and arrangement; valve gears and starting mechanisms; system of speed control, ignition and cooling. Application of the indicator and consideration of indicator diagrams.
A study of the power gas producer including suction and pressure types for various fuels; construction and operation of the generator and accessory apparatus. Application to various industrial purposes. Recitations and lectures. Open only to students pursuing course v in chemistry.
- XXIII. Mechanical engineering.** Senior I. 36 hours. *Professor Flather.*
Measurement of power. A study of the methods employed in measuring power. Dynamometers, Prony brakes; measurement of water power; water meters; weir measurement, flow of water in pipes; measurement of electric power, efficiency of motors; power required to drive machine tools and shafting. Recitations and lectures. Preparation, course II in applied mechanics.
Air compressors and motors, and the transmission of power by compressed air. Recitations and lectures. Preparation, course II in applied mechanics.
- XXIV. Mechanical engineering.** Senior I. 36 hours (Elective.) *Mr. Oliver.*
Heating and ventilation. Principles of heating and ventilation. Construction and operation of heating apparatus. Steam, hot water, exhaust, vacuum and fan systems. Lectures, recitations and problems.
Journal Club—Open to the seniors and juniors. Once a week.

MECHANICAL ENGINEERING LABORATORY.

- XXV. Strength of materials.** Junior I. 72 hours.
Assistant Professor Kavanaugh and Mr. Shoop.
Laboratory work investigating the strength and physical qualities of iron, steel, brass, copper, belting, chains, beams. Open only to students pursuing course I in mechanics.
- XXVI. Mechanical laboratory.** Junior II. 72 hours.
Assistant Professor Kavanaugh and Mr. Shoop.
Continuation of course XXV; also exercises in valve setting, indicator practice, calibration of steam gauges, calorimetry, efficiency of screws and hoists. Preparation: course XVIII.
- XXVII. Hydraulic laboratory.** Junior II. 72 hours.
Assistant Professor Kavanaugh and Mr. Shoop.
Hydraulic measurements, calibration of weirs, nozzles, orifices and meters, tests of water meters, rams, pulsometers, pumps and other hydraulic apparatus. Preparation: course XXV.
- XXVIII. Mechanical laboratory.** Senior I. 108 hours.
Assistant Professor Kavanaugh and Mr. Shoop.
Calibration of dynamometers and other apparatus. Testing lubricating value of oils; tests of injectors, steam engines and boilers, and complete power and lighting plants. Preparation: course XXV.
- XXIX. Mechanical laboratory.** Senior I. 108 hours.
Assistant Professor Kavanaugh and Mr. Shoop.
Hydraulic measurements, calibration of weirs, nozzles, orifices and meters. Tests of water motors, rams, pulsometers, steam pumps and other hydraulic apparatus. Calibration of dynamometers and other apparatus. Testing lubricating value of oils; tests of injectors, steam engines and boilers. Preparation: course XXVI.
- XXX. Mechanical laboratory.** Senior II. 144 hours.
Assistant Professor Kavanaugh and Mr. Shoop.
Tests of gas and hot air engines; gas producers; air compressors; automobile and locomotive testing and other special work. Preparation: course v in chemistry, and XXVIII.
- XXXI. Mechanical laboratory.** Senior II. 72 or 144 hours (Elective.)
Assistant Professor Kavanaugh and Mr. Shoop.
Special research work and commercial tests.

XXXII. *Mechanical laboratory.*

Senior II. 72 hours.

Assistant Professor Kavanaugh and Mr. Shoop.

Special modification of courses XXIX and XXX, covering work in hydraulic measurements, steam engine and boiler testing for students in mining and metallurgy.

FOR GRADUATES.

RAILWAY MECHANICAL ENGINEERING.

The following courses are available to seniors desiring to prepare themselves for special work in railway engineering.

XXXIII. *Railway technology.*

Senior I. 72 hours

Assistant Professor Kavanaugh.

The object of this course is to familiarize the student with the principal details of construction of locomotives, and consists of a systematic course of shop visits carried on in the various railroad shops in the vicinity, supplemented by lectures and recitations.

XXXIV. *Railway design.*

Senior II. 144 hours.

Professor Flather.

- (a) Of link and valve motions. Continuation of course XII with
- (c) Of the locomotive boiler.
- (d) Of assembled parts. Preparation: course XXXIII.

XXXV. *Locomotive construction.*

Senior II. 36 hours.

Professor Flather.

Lectures, reading and recitations on design and construction of locomotives, supplementing course XXXIV. This treats—

- (a) Of parts not involving the boiler and use of steam; but in special applications of the Stephenson link.
- (b) Of locomotive and car details. Including the carriage, as frames, springs and equalizing arrangements, running gear, brakes, trucks, lubrication.
- (b) Of locomotive boilers and connected parts. Types, proportions, grates, flues, smoke-box arrangements and stacks. Riveted joints, bracing and staying. Lagging, smoke prevention.
- (c) Of the locomotive engine. Details, heat insulation, cylinder proportions for various types, weight on drivers, special service; crank effort diagrams with inertia of reciprocating parts, cylinder and receiver ratios for compound engines, starting valves for compounds.

XXXVI. *Locomotive road testing.*

Senior II.

Professors Flather and Kavanaugh.

- (4) Advanced work will be given to graduate students in
 - (1) Engineering design.
 - (2) Experimental Investigations in the Laboratory.
 - (3) Railway Engineering.

In each of these courses the student must satisfy the head of the department that he is able to satisfactorily carry on the work proposed.

This work will be largely a continuation of that laid down in the courses for undergraduate students, and will consist in original designing and experimental research along various engineering lines: studies and investigations relating to the economic administration of manufacturing plants; also special lines of investigation will be followed in connection with railway mechanical engineering. This will be accompanied by a similar line of work in the drawing room in which original problems will be taken up by the student.

PHILOSOPHY AND PSYCHOLOGY.

FOR UNDERGRADUATES AND GRADUATES.

I. *Analytic psychology.*

II. *Mr. Swenson.*

An advanced course treating in detail the more important problems of psychology.

II. *Experimental psychology—the senses.*

I. *Assistant Professor Miner.*

Four hours laboratory work and one hour discussion. Typical experiments on sensation and movement. [Not given 1906-7]

III. *Experimental psychology—higher mental processes.*

II.

Assistant Professor Miner.

A continuation of course II. [Not given 1906-7]

- IV. *Psychological interpretations.* I. Assistant Professor Miner.
Unusual and pathological mental states are studied for the light they throw on normal mental life. The sub-conscious, dreams, telepathy, hypnotism, secondary personalities, are among the topics treated.
- V. *Research in Psychology.* I, and II. Assistant Professor Miner.
Original work on special topics.
- VI. *Ancient philosophy.* I. Professor Wilde.
Lectures and reading of Greek philosophy.
- VII. *Modern philosophy.* II. Professor Wilde.
Lectures and reading of philosophy since the Renaissance.
- VIII. *The principles of ethics.* I. Professor Wilde.
Systematic study of the principles of conduct.
- IX. *Philosophy of religion.* II. Professor Wilde.
A study of the development and significance of religion.
- X. *Logic of science.* I. Mr. Swenson.
A study of the presuppositions of the sciences.
- XI. *Philosophy of Spencer.* II. Mr. Swenson.
A critical reading of the *First Principles*.

FOR GRADUATES.

Courses from the following list will be offered to graduates each year as determined by the needs and qualifications of the students presenting themselves.

- I. *Philosophy of Aristotle.* Mr. Swenson.
A critical reading of the *Metaphysics* in the Greek.
- II. *Philosophy of Kant.* Mr. Swenson.
- III. *Philosophy of Hume.* Mr. Swenson.
- IV. *Descartes, Spinoza and Leibniz.* Mr. Swenson.
- V. *History of ethics.* Professor Wilde.
- VI. *Systematic ethics.* Professor Wilde.
- VII. *German idealism.* Professor Wilde.
- VIII. *Metaphysics.* Professor Wilde.
- IX. *Swedish Philosophy.* Professor Carlson.
- X. *Psychological problems.* Assistant Professor Miner.

PHYSICS.

FOR UNDERGRADUATES AND GRADUATES.

- I. *Mechanics, properties of matter, heat, sound.* [6] I. Professor Jones.
Experimental lectures, recitations and laboratory work.
Open to those who have completed Algebra and Trigonometry of courses III. and IV.
- II. *Light, electricity and magnetism.* [6] II. Professor Jones.
Experimental lectures, recitations and laboratory work.
Open to those who have completed course I.
- III. *Electric measurements.* [3] I. Professor A. Zeleny.
Lectures and laboratory work.
Open to those who have completed course II.
- IV. *Physical manipulations and laboratory technique.* [3] II. Professor A. Zeleny.
Open to those who have completed courses I. and II.
- V. *Theoretical mechanics.* [3] II. Professor Jones.
Open to those who have completed Calculus and course I.
- VI. *Advanced laboratory work.* [3] I. Prof. J. Zeleny.
Open to those who have completed course II.

- VII. *Advanced laboratory work.* [6] I. Professor J. Zelcny.
Open to those who have completed course II.
- VIII. *Advanced laboratory work.* [3] II. Professor J. Zelcny.
Open to those who have completed course VI.
- IX. *Advanced laboratory work.* [6] II. Professor J. Zelcny.
Open to those who have completed course VI.

FOR GRADUATES.

- X. *Kinetic theory of gases.* [3] Assistant Professor Erikson.
Open to those who have completed course II.
- XI. *Radio-activity.* [3] Mr. Kovarik.
Open to those who have completed course II.
Advanced laboratory work. Open to those who have completed course VI.
- XII. *Discharge of electricity through gases.* [3] Professor J. Zelcny.
Open to those who have completed course II.
- XIII. *The theory of light.* [3] Professor Jones.
Open to those who have completed course II.
- XIV. *The mathematical theory of electricity and magnetism.* [3] Assistant Professor A. Zelcny
Open to those who have completed course III.
- XV. *Laboratory practice* Professor J. Zelcny.
Original investigation in some special field being the principal feature of this work.

These courses may not be given simultaneously. Students wishing to pursue one or more of these courses should consult the head of the Department.

POLITICS.

FOR UNDERGRADUATES AND GRADUATES.

- III. *The elements of jurisprudence.* I. Professor Schaper.
A study of those human relations requiring legal regulation considered from the American point of view; the nature and sources of law, status, rights and wrongs, sovereignty, corporations, etc. The course is intended as a preparation for active citizenship as well as for the study of law. The student will practice looking up cases summarizing principles. The course is based on a text, with lectures and assigned reading.
- II. *Comparative government.* I. Professor Schaper.
An account of the government as the agent of the state; a comparative study of the organization and workings of the governments of the great European powers of today, including the French, German, British and others. Text with lectures and assigned reading.
- IV. *American constitutional law.* [2] Seniors and graduates I and II. Professor Schaper.
This is an advanced course in the study of the principles of our constitutional law based on important supreme court decisions and standard works.
- IX. *Politics and administration.* [2] I and II. Professor Schaper.
A course in politics and administration throughout the year. A study of American administration as a branch of public law and as a science, including an examination of the extra-legal institution, the political party; its nature, organization, function, evils and reforms. Such topics as the initiative and referendum, proportioned representation and direct primaries versus the convention plan are taken up.

VIII. *Theory of the state.*II. *Professor Schaper.*

A study in the theory of the state, its origin, nature, purpose and its justification: the state on its physical side, that is, the elements of population and territory. Important theories, like the divine, contract, instinct, the modern socialistic, anarchistic and social welfare, are considered: also the question of state interference and state management of industries. It includes a study of classification of states and of governments, of sovereignty, the origin, nature and classification of law. This course follows course I. A text book with lectures and topical readings.

VII. *Municipal administration.*II. *Professor Schaper.*

A comparative study in modern city charters and methods of administration. The relation of the city to the state, the delimitation of its sphere of activity, its liability for tort, and an investigation into the causes of corruption and merits of proposed reforms.

FOR GRADUATES.

XI. *Seminar in Political Science.*I and II. *Professor Schaper.*

the discussion of current problems in administration, politics and public law.

SCANDINAVIAN.

FOR UNDERGRADUATES AND GRADUATES.

VI. *Scandinavian literature.**Professor Carlson.*

History of the literature and a study of special authors.

FOR GRADUATES.

Courses offered by *Professor Carlson.*VII. *Icelandic or Old Norse.*

The history, language and literature of Iceland and Norway from earliest times to 1500 A. D.

VIII. *Old Swedish.*

The history, language and literature of Sweden from earliest times to 1500 A. D.

IX. *Old Danish.*

The history, language and literature of Denmark from earliest times to 1500 A. D.

X. *Modern Danish language and literature.*XI. *Modern Swedish language and literature.*XII. *Modern Norwegian language and literature.*

SEMITIC LANGUAGES.

FOR UNDERGRADUATES AND GRADUATES.

I. *Elementary Hebrew.*I, II. *Assistant Professor Deinard.*

Harper's Elements of Hebrew and reading of easy prose passages of the Old Testament.

II. *Advanced Hebrew.*I, II. *Assistant Professor Deinard.*

Critical reading of some Old Testament book, with a review of Hebrew grammar.

III. *Elementary Arabic.*I, II. *Assistant Professor Deinard.*

Socin's Arabic Grammar and reading of the prose selections contained in it.

IV. *Advanced Arabic.*I, II. *Assistant Professor Deinard.*

Selected Suras of the Koran and a review of Arabic grammar.

V. *Elementary Aramaic or Syriac.*I, II. *Assistant Professor Deinard.*

Strack's Grammatik des Biblischen Aramaisch, and Brockelman's Syrische Grammatik.

VI. *History of the Hebrews to the close of the Persian period.*

I, II. Assistant Professor Deinar.

Political, religious and social. The English Bible will be used as a text book, a careful study of the Palestinian and Assyro-Babylonian inscriptions will be made, and the works of some modern writers on Hebrew history will be consulted. No knowledge of any Semitic language is required for this course.

FOR GRADUATES.

Courses offered by Assistant Professor Deinar.

I. *Critical study of one of the following Old Testament books:*

Isaiah, The Minor Prophets, The Psalms, or Job.

II. *Early Arabic poetry.*

And the relation of the Arabic, grammatically considered, to the Hebrew.

III. *Reading of the Aramaic portions of the Old Testament.*

And a review of Aramaic grammar.

IV. *History, prophecy and the monuments.*

Studies in the early history of the Semites.

SOCIOLOGY.

FOR UNDERGRADUATES AND GRADUATES.

V. *Social Groups.*

I. Professor Smith.

An examination of the clan and the village in primitive life, a study of demography to discover the effect of environment upon social organization, and a comparison with the nature of and reasons for the modern city.

VI. *The Study of Institutions.*

I. Professor Smith.

The genesis of custom and the beginnings of law with the geographical and race influences in the growth of states, will be studied, as well as the various forms of the family and their relation to forms of civilization.

VII. *Elements of Sociology.*

I. Assistant Professor Jenks.

This course is similar to I, but will be more exhaustive. Text books, lectures, assigned readings, and thesis. Open to Juniors and Seniors.

VIII. *Anthropology.*

II. Assistant Professor Jenks.

An advanced course. A study of the different races of America, Asia, Africa, and Oceania: a description of the types of primitive culture: an investigation of the origin and development of various phases of culture—of forest, plain, desert, and island; and a presentation of anthropological problems. Text books, lectures, assigned readings and thesis. Open to Juniors and Seniors.

IX. *The Philippines.*

I. Assistant Professor Jenks.

This course will present the geography, physiography and resources of the Philippine Islands. A careful comparative study of the four large culture groups of people will be made; tropical influence will be noted: the present policy of the Insular Civil Government will be outlined, so far as it tends to modify the natural characteristics and the modern culture of the inhabitants. This course aims to present a model for the investigator of human culture, and to prepare students for government, business or missionary service in the Philippines. Lectures, illustrated lectures, assigned readings and reports.

STRUCTURAL ENGINEERING.

Courses offered by Professor Constant.

FOR UNDERGRADUATES AND GRADUATES.

I. *Structural designs.* Prerequisite, courses in stresses and structural details

Senior I. 170 hours; II. 170 hours.

Theory and design of steel structures, including railway and highway bridges, standpipes and towers, and other problems of structural interest. Theory of higher structures. Reference: Johnson's Stresses, Merriman's Part III and IV Bridge Series. Ten hours per week.

- II. *Masonry construction.* Prerequisite, I. Senior I. 136 hours.
 Properties of stones, bricks, cement and concrete, and their use in engineering structures. Foundations, retaining walls, piers and abutments, dams and chimneys. Theory of reinforced concrete. Theory and design of masonry arches. Design of stone and concrete structures. Lectures and textbook work, two hours per week; drawing room work, six hours per week. Reference books: Baker's Masonry, Church's Mechanics, and current periodical engineering literature.

FOR GRADUATES.

- III. *Swing and lift bridges.*
 Detailed study of mechanism and power for operating moving bridges, and complete design, with working drawings for a swing or bascule bridge.
- IV. *Higher structures.*
 Theory and design of cantilever, suspension and arch bridges. Analysis of indeterminate structures and complex portal bracing. General theory of flexure and application to special problems.

Graduate Students 110

Adams, Cynthia,	Geology and Mineralogy.
Anderson, P. J.,	German.
Andrews, S. W.,	Elec. Measure. of Precision.
Baird, Roy,	Law.
Bass, Lillian,	French, English, Greek.
Bates, Wm. Earl, L. L. M.,	Law.
Beeler, L. H., M. A.,	Political Science.
Beggs, Mr.,	Greek.
Bell, Elizabeth, M. A.,	Philology, English.
Bell, Margaret G.,	German.
Brooke, Helen M. A.,	German.
Brooke, W. E.,	Theoretical Mech. and Math. Physics.
Brady, Eva W., M. A.,	History.
Brown, C. W.,	Physics.
Buenger, Theodore,	Greek, Latin.
Butters, Fred K.,	Geology and Mineralogy.
Burrill, P. C.,	Physics, Astronomy, German.
Byrnes, Mary,	History.
Carlson, Philip,	Political Science.
Cheyney Edward,	Forestry, English, German.
Conway Estelle, M. A.,	German, History.
Cooper, W. T.,	History.
Dalaker, H. H.,	Astronomy, Theor. Mechanics and Math. Physics.
Denegre, James D.,	Law.
Ellinger, George H.,	German.
Erickson, H. A.,	Physics, Astronomy, Theoretical Mechanics and Math. Physics.
Faunce, Carroll, M. A.,	German.
Fisher, Jas.,	Chemistry, Physics.
Frary, Francis C., M. S.,	Electro Chemistry.
Fugleskjel, O. O., M. A.,	Scandinavian.
Funk, Henry D. M. A.,	History, Philology.
Gates, F. W.,	Astronomy.
Gaumnitz, Daniel, M. Agr	Botany, Agriculture.
Goldman, Sara,	History.
Graves, Ethel,	History.
Griggs, Robt., M. A.	Geology and Mineralogy.
Grimsby, W. H., Ph. D.,	Scandinavian, History.
Hall, Jennie,	German, Geology and Mineralogy.
Hanson, Peter,	Sociology, Mun. Govt., R. R. Transp.
Harholdt, Marie, M. A.,	Philology, German.
Hayward, Thomas E.,	German.
Harrington, Miss,	Latin.
Harvey, Elizabeth, M. A.,	Philosophy and Psychology.
Hatton, R.,	Economics, Political Science.
Hendrickson, H. N., M. A.	Latin, Pedagogy.
Henry, Laura,	German.
Herman, Arthur L.,	Law.
Hohn, C. G.,	Economics, Political Science, Philology.
Holmstedt, Victor,	History.
Huff, Ned, M. A.,	Geology and Mineralogy, German.
Kovarik, A.,	Theor. Mechanics and Math. Physics.
	Astronomy, Physics.
Love, Harry D., M. A.,	German, Latin, Greek.

McClintock, W. M.,	Electrical engineering.
McCurdy, Pearl,	Latin.
McLaughlin, Eliz.,	History.
McElmeel, B. C.,	History.
McKey, Jos. A., M. A.,	English, French, German.
Magnusson, Leifer, M. A.,	French.
Mailey, Linda,	History.
Mattson, Rev., P., Ph. D.,	Scandinavian.
Mehan, James E.,	Law.
Melby, Gustav, M. A.,	Scand., Philology, Semitic Lang.
Melom, Carl,	French.
Mercer, Hugh V.,	Law.
Middleton, Miss, M. A.,	Spanish, French.
Miller, F. C. Ph. D.	Pol. Sci., Hist., Geol.
Moore, Albert R.,	Law.
Moore, Edith, M. A.,	History.
Myron, O. C., M. A.,	Philosophy and Psychology, History.
Nelson, E. A.,	History.
Nixon, Lillian M. A.,	French.
Northrop, Jessie,	History.
Oglevee, Nannie G.,	German.
Olds, Bessie,	Drawing Design.
Oleson, Peter, M. A.,	German, History.
Orsborn, H. E.,	Geology.
Osterberg, Arthur G.,	Law.
Parbody, Eunice,	Philosophy and Psychology.
Pehaushek, Charles,	German.
Peterson, G. A., Ph. D.,	Philology, Scand.
Potter, Frances B.,	French.
Ransom, Gilbert R.,	Physics.
Rechert, Rev. C.,	Political Science.
Riecke, A. A.,	History, German.
Ringstad, Edw., C., M. A.,	Scandinavian, Philology.
Rollefson, Edw., M. A.,	German.
Rosenbaum, John,	Philosophy and Psychology.
Sandvall, Ruth, M. A.,	Latin, Greek, German.
Seyerson, Sam,	Philosophy and Psychology.
Sheldon, Eleanor,	German.
Shellenberger, Emma,	History, French.
Shimizu, Tomesabua,	Law.
Skinner, S. A., M. A.,	Theor. Mechanics and Math. Physics.
Smith John W.,	Botany, Zoology, Chemistry.
Stevens, Homer Wm.,	Law.
Stuart, Robert Kincade,	Law.
Swanson, Anna, M. A.,	Philology.
Thompson, Eva,	History, Geology and Mineralogy.
Thompson, Wm. E.,	Law.
Thorson, N. Anton,	German.
Truesdell, W. H., M. S.,	Geology and Mineralogy.
Tucker, Florence,	German, Latin.
Urseth H. A., M. A.,	Philology.
Warrington, Helen, M. A.,	German, History
West, Ruth,	German, History
Wilhoit, A. D., M. A.	Chemistry, Metallurgy.
Willis, Hugh E.,	Law.
Yardley Mary, M. A.,	German, Latin.
Zeleny, A., Ph. D.,	Theoretical Mech. and Math. Physics.



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